It is a pleasure to introduce two writers, new to our readers, in the same issue. We refer to Realto E. Cherne, Application Engineer of the Carrier Corporation, and Frederick L. Kahn, Equipment Engineer of the Automatic Electric Company. The former authors a very complete discussion of "Air Conditioning for the Telephone Exchange" while Mr. Kahn discusses "Reverting Calls in Automatic Exchanges." Both articles start in this issue.

▼

A reader calls our attention to the golf tournaments most of the state associations are featuring as part of their entertainment. He suggests the golf course is the 20th century "field of honor," but suggests there has been always too many fields and too little honor. To a golfer, honor is the privilege of shooting first — not bowing first. We congratulate the associations in promoting their golf get-togethers.

▼

We are watching with interest the efforts of various columnists requesting their readers to rename the handset. So far "French Phone" is still the leader. None suggested have as yet rung the bell—no zip!

TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

Vol. 42 No. 4 **April, 1938**

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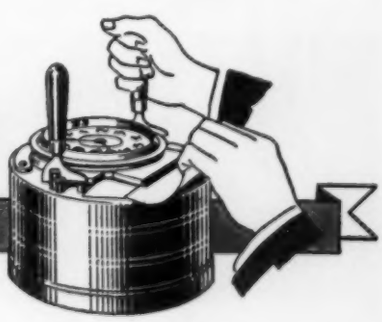

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Air Conditioning For Telephone Exchanges

By REALTO E. CHERNE*

*Application Engineer
Carrier Corporation
Syracuse, New York

Typical installation of evaporative condenser. The units are hot dipped galvanized and may be exposed to outside weather conditions without damage

ONE of the numerous problems confronting telephone engineers is that of designing equipment which will give continuous service regardless of the vagaries of the weather, if considered locally, or climate, if considered geographically. It is well known that dirt can cause considerable trouble if allowed in equipment rooms and also that prevailing high humidity will injure insulation and allow electrolytic action to take place between exposed metallic parts carrying different potentials. The advances made during the past twenty-five years in the science of air conditioning, if applied to telephone plants, will do much to eliminate problems introduced by carriable atmospheric conditions.

The principles of psychrometrics are so widely known it is unnecessary here to enlarge upon such fundamentals as maximum moisture contents being related to the temperature of the air and the thermodynamics involved when reducing both temperature and moisture content of air. This article, therefore, is limited to the discussion of: the need for air conditioning in telephone plants; description of some existing installations; design features peculiar to this application of air conditioning; air handling and refrigeration equipment available commercially; and owning and operating costs of equipment.

1. Clean Air A plaguing and constant chore which cannot be dismissed lightly is that of keeping dirt accumulations from causing mechanical difficulties with exposed contacts and other equipment. The best point of attack, of course, is to eliminate extraneous matter from all air introduced into switch and other equipment rooms. Since the greatest volume of telephone service is localized in densely populated districts and industrial communities, telephone exchanges are frequently located in centers where the outdoor atmosphere is anything but clean. All air used for ventilation must be filtered and a sufficient quantity should be introduced to insure positive pressure in the rooms, thus minimizing infiltration of dirt through cracks around windows and doors.

Many types of air cleaning devices are available for use in conjunction with air handling equipment. It is one of the problems of the ventilating or air conditioning engineer to keep abreast of developments of air filters in order that he may properly evaluate the economics of selection for a particular duty. Air cleaning may be obtained by use of a straight ventilation system or may be classed as a "byproduct" of a complete air conditioning system.

2. Manual Switchboards Since it is highly desirable to maintain as low a sound level as practical, extraneous noises should not be allowed to enter the switchrooms through open windows. There is danger that such noises will be heard and even amplified at the terminus of a cell. Further, the operator's efficiency is reduced when working in a room with a high noise level.

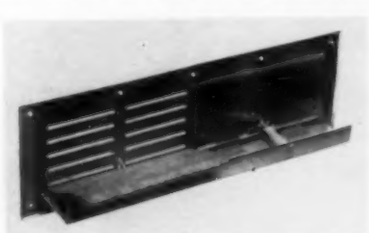
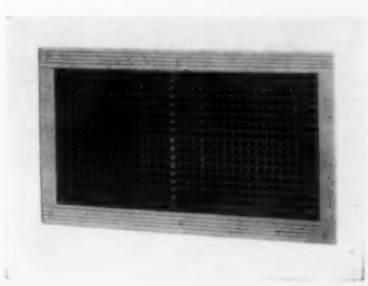


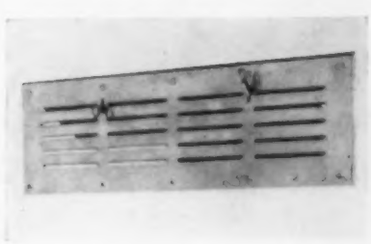
Fig. 1. Slotted type and adjustable louvre type outlets suitable for introducing the air at high velocity and properly distributing it over the entire conditioned area

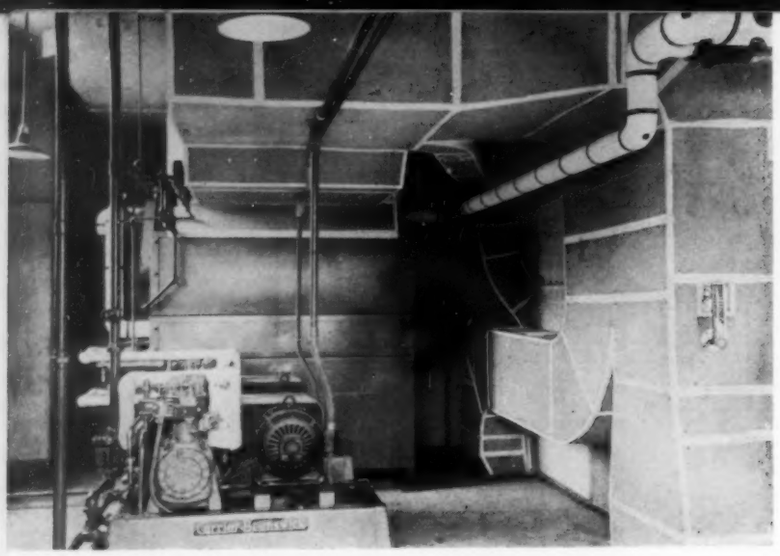
An air conditioning system makes it unnecessary to open windows at any season of the year; in fact, it is even unnecessary to have windows. This is borne out by the constantly increasing use of glass brick in place of the usual glazing—and the construction of windowless buildings.

This leads to the next point of discussion inasmuch as ventilation relates to the comfort of employees as well as to the protection of telephone equipment.

3. Ventilation and Comfort Ventilating equipment of some kind is essential in all the larger manual exchanges, since windows must be kept closed, to exclude noise and dust, and the internal heat load due to lights, power and people, will build up to unbearable limits. Hence, the cost of air bearable limits. Hence, the cost of air conditioning is the difference between







Multiple compressors, unitary direct expansion dehumidifier and supply duct mains installed for conditioning terminal room, main operating room, and long distance operating room of Main Exchange, Rochester Telephone Company, Rochester, New York

the dollars spent on air conditioning and the dollars which would otherwise be spent for ventilation, assuming, for example, a new building. Superior comfort conditions can be maintained with less air, and, therefore with small ducts and smaller air handling equipment, filters, etc. The effects of comfort conditioning are to build goodwill by improving service through improved human efficiency and by aiding in maintaining the standards of courtesy.

Temperature and humidity design conditions vary somewhat in the different localities and different countries. As an index, comfort conditioning in New York would ordinarily call for equipment to hold 90 degrees DB and 50% RH in summer and 70 degrees to 75 degrees DB and 40% to 55% RH in winter.

4. Protection of Equipment Against Excessive Humidity The number of people usually employed for maintenance of equipment in automatic switch-rooms and other equipment rooms is not large, and thus from the Telephone Industry's point of view advancement should be directed toward design of equipment and moisture. However, even with comparatively "trouble free" equipment, some maintenance would be required and the comfort and well being of the employees could not be ignored.

This point raises a question as to whether it will be more costly to provide telephone equipment which will be unaffected by dirt and moisture, or use less expensive equipment and protect it by use of air conditioning. No data on this is available but telephone engineers are not likely to overlook such an economic study.

Hygroscopic materials, such as used for some types of insulation, seek a moisture content in equilibrium with surrounding atmospheric conditions, being particularly related to relative humidity. Moderate relative humidites can be obtained by use of reheat to raise the room dry bulb temperature. Comfort conditions are quickly affected, however, by any such increase in temperature on warm, muggy days.

All substances have the property of producing a minute but extremely dense film of gas and vapor on its surfaces. This is in the nature of adsorption in that it will occur without the temperature of the substance going below the dewpoint of the air. These minute quantities of water vapor decrease the resistance of insulating materials, increase current leakage, and are frequently productive of trouble with metallic contacts. In considering the relative humidities which will prevail without air conditioning, it must be borne in mind that, since there is usually little internal heat in an automatic exchange, the dew point will closely follow that of the outside air and the dry bulb will tend to follow a mean of outside temperature because of the heat storage effect of the structure and interior fittings. Obviously, if after a period of moderately cool weather, high outdoor humidities occur, actual condensation may form on the colder surfaces of equipment. Thus, improvement in reliability may be expected if a dehumidification system is installed.

5. Value of Winter Humidification Winter humidification tends to prevent the formation and suspension of dust particles due to avoidance of static electricity. With moderate humidities (45-55%) there is less tendency for particles of dust to become electrified and adhere to metalic objects.

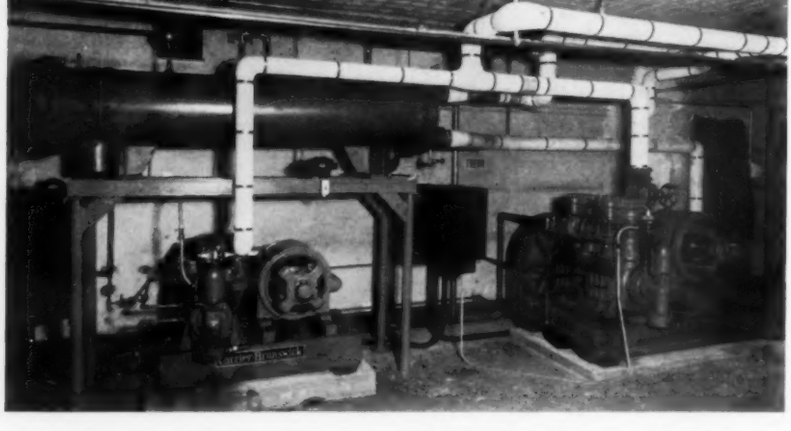
It has been shown by studies by one of the large insurance companies that maintenance of proper humidities and temperatures reduces the time lost by employees due to colds and other winter ailments. This is of advantage in manual exchanges.

It so happens that the air conditioning equipment recommended for summer dehumidification is complete with sprays for washing all conditioned air and these are suitable for adding moisture to the air during the winter humidifying season. Sprays are desirable to assist the filters in cleaning the air and also for providing evaporative cooling during intermediate seasons when the outside wet bulb is low but when a high outside dry bulb or internal heat load make cooling desirable.

6. Reduction of Power required for Transmission In large exchanges where many miles of cables are exposed to the interior atmosphere, it is not inconceivable that the losses in power caused by humidity effecting insulation will be appreciable. The magnitude of this possible saving is not known. However, the cost of completely moisture protecting cables, etc., within the building would be considerable if the power loss and other troubles are to be eliminated in this manner.

7. Prevent Loss of Tickets In Pneumatic Tubes Extremely high humidities cause trouble with handling of paper tickets through pneumatic tubes. Not only

(Please turn to page 44)



Typical installation of Freon compressors. Note single water cooled condenser for one large and one small compressor.

TELEPHONE ENGINEER
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APRIL, 1938

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

THE FCC will transmit no Final Report on the Telephone Investigation to Congress at this session, according to all indications.

Despite the hopes of the Commission leadership to dispatch the final views of the agency on the three-year $1,500,000 probe of the American Telephone and Telegraph Co., the Bell System and Independent industry to Capitol Hill before the adjournment of Congress, it is deemed a practical and physical impossibility for the FCC members to whip together their revision of the Proposed Report submitted by Commissioner Paul A. Walker and the Investigation staff by mid-May or early June, which seem to be probable times for Congressional adjournment.

That the Proposed Report of Commissioner Walker is to be greatly revised seems certain as the other members of the FCC are understood to be in disagreement with many phases of his document. Foremost in the dissension among the Commissioners is the proposal for unprecedented expansion of governmental regulation in the form of reviewing, approving or disapproving all management practices and policies. This appears certain to be drastically revised, according to the present views of the FCC members, if not entirely eliminated.

● Another subject is the recommendation for the branding of Western Electric Co. as a public utility which would permit the FCC to review all costs and prices of apparatus and equipment. There seems to be good basis for belief that this may be greatly modified. However, it would not be surprising if a plan for an annual report on telephone manufacturing activities from Western Electric and other manufacturers, especially those which are a part of integrated systems, might not be suggested to Congress—with a uniform system of accounts formulated. On depreciation, the Final Report might consider the question of periodical adjustment of the depreciation accrual rates, while in connection with the regulation of financing it appears logical that the FCC might seek powers similar to those already held by the Interstate Commerce in its railroad supervision.

● *The division of views among the Commissioners on the final form of the Telephone Report loomed as the principal barrier in the path of a speedy revision for transmittal to Congress.* Because of the length of the Proposed Report of the Investigation Staff — some 1,100 pages which some newspapers described as lengthy as "Gone With The Wind"— the Commissioners have found it impossible to study and to form their own views during the crush of their day-by-day work. There appears also to be a distinct disposition to weigh the contents and recommendations of the Proposed Report in the light of the one-sided proceedings (where only the Investigation Staff witnesses testified or submitted exhibits without cross-examination or rebuttal testimony by the telephone company). While it is believed doubtful if the Investigation proceedings will be reopened to an extent of permitting testimony by the A. T. & T., there is a probability that the Commissioners in the Final Report drafting may consider the answers filed by the A. T. & T. with the Investigation staff —and rejected as not conforming with the policy of only allowing factual corrections—so as to obtain both sides of the picture.

Rate and Research Unit Doomed

ONE RECOMMENDATION of the Proposed Report which urged a deficiency appropriation to continue the Telephone Rate and Research Division of the Investigation as a regular unit of the Commission appears definitely doomed. Neither Congress nor the Commission has taken any notice of the plan and as a result this Rate and Research unit, which is headed by Carl I. Wheat, Telephone Rate Counsel, will be dissolved next July.

● The Proposed Report of Commissioner Walker apparently has created little attention or interest in Congress. While copies of the Staff Report were sent to the chairmen of the Senate and House Interstate Commerce Committees and later to the members of the two committees, up to mid-April there had been no reference to it on the floor of either Congressional body other than a proposal of Chairman Wheeler of the Senate Committee to have 2,000 copies printed as a Senate document which was supported by Senator Bone, Democrat, Washington. However, there is considerable doubt whether the Proposed Report will be printed by Congress, because members of the Congressional Printing Committee seem to take the attitude that only final reports of governmental agencies should

be published by Congress and not preliminary or single member documents. The Proposed Report also has been sent to all state commissions, and some of these state bodies are believed to have urged the Congressional document although there has been no concerted or unanimous action by the state commissions in that direction.

Newspaper Editorials Criticize Investigation As Exparte

The release of the Proposed Report on April 1, which came as a great surprise in the National Capital, provided a Page One newspaper story throughout the nation, although it was noted that every correspondent, including Ruth Finney of Scripps-Howard (who is rated as possibly the keenest student of utility regulation in Washington journalism), handled the findings with caution and stressed prominently that it was NOT the report of the entire Commission but only the views of one Commissioner and the Investigation Staff. From a news column publicity standpoint the release of the Proposed Report provided the FCC with the greatest outburst of news prominence in its history, but it proved a "one-day sensation."

BUT there was instantaneous reaction from the newspaper editors—almost universally the Telephone Investigation was harshly censured by the editors and the Proposed Report was criticized as embarking on a program of government regulation which would be injurious to an American industry which had the best service in the world and was well liked by the American public.

The keynote of the editorial criticism was against the ex-parte method of the Investigation, which was termed as ranging from a "Moscow trial" to "bias and prejudice." The 25 per cent rate reduction which proved to be the "headline" catchword in the news reports was depicted as not founded upon any basis of proof and many editors emphasized that the Bell System would have reduced rates to this level without FCC regulation if it had been feasible and practical from a standpoint of maintaining service and fair profits.

The fact that the newspaper editorials were published in newspapers of all parties—Republican, Democratic and Independent—in all sections of the country demonstrated a most amazing reaction of public opinion. Generally, there is little, if any, defense of business when it is under fire by a governmental investigation, particularly in the case of a public utility, but the FCC Proposed Report brought forth such a volume of censure against the methods of the Investigation and many of its proposals for increased regulation that there seemed little doubt these views would have great influence not only upon the Commission in its drafting of the Final Report but also upon Congress.

CONVENTION SCHEDULE

Nebraska Telephone Association, Hotel Paxton, Omaha, April 19 and 20.

Kansas Telephone Association, Hotel Kansan, Topeka, April 27 and 28.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, Ohio, May 3, 4 and 5, 1938.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

North Dakota Telephone Association, Gardner Hotel, Fargo, May 17 and 18.

Wisconsin State Telephone Association and Wisconsin Locally Owned Telephone Group, Park Hotel, Madison, May 17-19.

United States Independent Telephone Association: Conference of Class A and Class B Companies, Edgewater Beach Hotel, Chicago, May 25 and 26.

Pennsylvania State Telephone & Traffic Association, Yorktowne Hotel, York, June 2, 3 and 4.

New York State Telephone Association, Seneca Hotel, Rochester, June 7, 8 and 9.

Washington Independent Telephone Association, North Bend, Washington, June 24 and 25.

Michigan Independent Telephone Association, Hotel Olds, Lansing, July 27 and 28.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, Sept. 21, 22 and 23.

Case Reappointment Seems Certain

The reappointment of Commissioner Norman S. Case, rated as one of the ablest members of the FCC, whose term expires next June 30, appeared to be quite definite. Commissioner Case is a personal friend of President Roosevelt from the days when they were governors of Rhode Island and New York respectively and it is known that he enjoys the confidence of the Chief Executive on FCC affairs. A Republican, Commissioner Case has a record of service on the FCC that has won the praise of leading members of Congress as constructive and unprejudiced. His ability is especially noteworthy in passing upon legal problems of regulation and in weighing matters from a judicial viewpoint so that his continuance in the FCC post is regarded by observers as a most worthwhile reappointment. His reappointment would be for a seven year term.

Congressional Record and Outlook

The telephone industry will have gained every point in eliminating troublesome features in legislation during the second session of the 75th Congress which is slated to come to an end by mid-May or early June. Only two measures of especial significance have appeared during the present session. One bill, which was enacted into law increased the trade practice investigatory powers of the Federal Trade Commission and so as to avoid dual regulation the Senate succeeded in an amendment which exempted specifically telephone companies from this feature of the Trade Commission jurisdiction. Another measure, which would create an Aeronautics Authority and may be reported by the Senate and House committees at this session with some possibility of passage, contained a section which might have meant the lighting of telephone poles in wide areas around airports and along airways at the expense of the companies. But views of the Bell System and the U. S. Independent Telephone Association to eliminate this burden of expense from the telephone companies seemed to have received a favorable viewpoint from committee members on both sides of the Capitol and it is believed that the measure in final form will contain amendments which will remedy the situation.

● What will be the attitude of the next Congress (which convenes in January, 1939) rests in the laps of the gods—the votes of the American people. But there is a considerable unanimity among political observers that the next Congress will be a moderate Congress, unwilling to embark on any drastic new reforms or attacks on business. This will be important from the standpoint of the consideration of the FCC's Final Telephone Report. It also may mean that there will be an overhauling of the National Labor Relations Board with the objective of eliminating alleged unfair procedure and one-sided stands against employers and industries. The latter is important as the

(*Please turn to page* 38)

FCC Presents Proposed Report on AT&T Investigation

Drastic regulatory powers are asked for in Commissioner Walker's report. Chairman McNinch and Commissioner Craven emphasize that it is not final report. 25 per cent drop in rates proposed. Newspapers devote much editorial space in censor of several features.

Presented with dramatic suddenness the Proposed Report by FCC Commissioner Walker and the Investigation staff of the Federal Communications Commissions on its lengthy investigation of the American Telephone and Telegraph Company was presented to the Senate and House Interstate Commerce Commission on April 1. FCC Chairman McNinch emphasized it was NOT the final commission report but a Proposed Report by Commissioner Walker and the Investigation Staff. Its contents and drastic unprecedented proposals are now history as newspapers devoted many columns of editorial space commenting on its "one man" Proposed Report.

Briefly, the report suggested that a 25 per cent rate deduction amounting to an estimated $25,000,000 "may be made" throughout the entire Bell System through drastic increases of regulatory power over management policies, equipment costs and prices, intercompany contracts, financing and patents. That the Commission as a whole did not agree with the proposals as outlined by Commissioner Walker is significant.

Considered by many as a "trial balloon" the report Commissioner Walker and the Investigation Staff presented, was in Walker's own words "the report as proposed, presents my best judgment as to the actiton that should be taken by the Commission." Commissioner T. A. M. Craven issued a press release simultaneously stating his opinion on several of the features of the report as not agreeing with some of his ideas.

Effect of this "trial balloon" seems to be effectively answered by the comments made by the various newspapers throughout the country in their editorial columns.

The preponderance of newspaper editorial reaction to the Telephone Investigation Report of Commissioner Paul A. Walker was unfavorable to his more drastic recommendations of increased regulation and especially critical of the one-sided character of the inquiry and the lack in the report of any recognition of the excellent character of the telephone service and system. Some editorials, however, viewed his proposals as venturing forth ideas which could well be studied further and which could regulate possible abuses in the telephone system's activities and operations.

The editorial in the New York TIMES —the outstanding and probably most impartial newspaper of the United States— emphasized that the sweeping powers, asked by Commissioner Walker, go beyond the regulation of the ICC over railroads and "seem equivalent to Government management." The recent experience in Government management and regulation of business has not been such, the editorial commented, to make the powers sought by Commissioner Walker for the FCC as "in the public interest." The proposal to reduce rates 25 per cent without injuring net earnings was termed "almost self-contradictory." Commissioner Craven's statement was cited in the editorial as supporting the position that the "one-sided" method of the Investigation was not fruitful of better feeling and results. The TIMES editorial, published April 5, follows in full:

"The report on the American Telephone and Telegraph Company by Paul A. Walker of the Federal Communications Commission is said to be a document of 1,000 pages. Its preparation has covered a period of three years. Congress appropriated for the FCC $1,500,000 to cover its cost, and it has cost the telephone company itself some $3,-000,000. During the investigation the commission has had its own men working in the company numbering at times up to 250; they have had at their disposal more than 750 volumes of records, and have themselves issued seventy-seven volumes of reports. In view of all this, it would not seem profitable for outsiders at the present stage to attempt, upon the basis of the short summary that has been issued, to judge the Walker report as a whole or to pass upon the accuracy of specific findings of face.

Sweeping Criticisms Seem Strange

"But it is fair to note not merely that President Gifford of the telephone company has condemned the investigation as "one-sided from start to finish," that the summary of the report presents much 'that is simply not true,' and that some of his objections receive support from T. A. M. Craven, another member of the FCC, who serves notice of his disapproval of the matter in which the investigation has been conducted and of his inability 'as yet to reach final conclusions or to agree with some of the recommendations contained in the report'.

'In spite of the fact that the commission acted within its authority when it denied the right of cross-examination and rebuttal to the telephone company (Mr. Craven stated), I feel that more could have been accomplished and better feeling in general would exist had this privilege been granted.

'I believe that, in general, the report indicates the necessity for an improvement in the existing regulation of the telephone systems of the country. However, in making this assertion I believe it is only fair to recognize that the telephone service in this country is, in general, excellent, but that it is capable of improvement as a result of intelligent, constructive regulation.'

"The Walker report has not yet been approved by the full commission, and Mr. Craven's dissent seems to indicate that that approval is not assured. Certainly there are aspects of this preliminary report calculated to puzzle most readers. The statement that the Bell System could cut telephone rates about 25 per cent 'without interrupting existing net earnings' will seem almost self-contradictory to the uninitiated. The sweeping criticisms of depreciation practices, pension plans and public relations policies will seem strange to those who have come to believe that the American telephone system, whatever its faults, provides the most efficient telephone service in the world. But the recommendation that many persons will be most slow to accept is that the FCC should be granted power by Congress 'to review, approve or disapprove all Bell System policies and practices promulgated by the central management group of the American company.' The powers asked for are in some directions far in excess of those exercised over the railroads by the I.C.C., and a few of them seem equivalent to Government management. Our experience of the everwidening Government regulation and management of business in recent years has not been such as to make it appear axiomatic that the sweeping powers for the FCC now asked for by Mr. Walker would be in the public interest."

The CHRISTIAN SCIENCE MONITOR in an editorial April 2 commented that Commisisoner Walker was "doubtless over-optimistic" in his position that the Bell System could reduce telephone rates 25 per cent without impairing present earnings. The editorial cited that the Investigation showed some of the cumbersomeness and possible abuses of a large monopoly. Summation of its remarks in final paragraph reads as follows:

"The tentative report placed before the FCC goes rather far in some recommendations, but the fact that it has been given to Congress and the public in advance of indorsement by the whole Commission seems to indicate that it still will be the subject of close study and possibly some difference of opinion and revision.. Commissioner T. A. M. Craven's dissent indicates a more conservative approach, and even if Commissioner Walker's views prevail, those acquainted with his background feel sure that regulation will move gradually and soundly rather than precipitately."

The New York HERALD-TRIBUNE (April 2) in an editorial, entitled "The Telephone Report," stated that the proposals of the FCC Proposed Report to place the A. T. & T. under sweeping FCC regulation led it to "echo Mr. Gifford's cry of bewilderment: 'It just dosen't make sense'."

Under the heading of "Long Distance," the Washington HERALD, April 2, editorialized in the most favorable review that the results of the FCC investigation should bring "joy" to both subscribers and investors.

"Beyond the recommendation of strict regulation by the FCC of rates and financing," the editorial continued, "the most important conclusion arrived at is that if the telephone company would reduce its rate 25 per cent it would make more money. That strikes a welcome cord in the breast alike of the subscriber who pays and the investor who receives. Shall we some day see long distance calls as cheap as they are in Europe?"

"It is unfortunate," the Washington POST (April 3) in one of the ablest editorials on the Investigation report, "that his (Commissioner Walker) report could not have been withheld until the full commission was ready to pass judgment upon its findings. It is claimed, however, that a good many rumors, in some cases false and misleading, had been spread abroad concerning the nature of the report. For that reason—rightly or wrongly—the commission decided to make the document public at once. Both Chairman McNinch and Commissioner Craven have been careful, however, to make clear that they are not committed to its acceptance. Commissioner Craven, indeed, says he disagreed with some of the recommendations. He also thinks that the A. T. & T. should have been permitted to question witnesses and rebut adverse testimony, although he does not doubt the authority of the commission to withhold such privileges.

"It now remains for the FCC in its official capacity, to decide upon a course of action. With the vast mass of factual information already at its disposal it seems unlikely that further probing into the affairs of the company would be particularly useful. But it would be conducive to better feeling and to a sounder evaluation of the regulatory system for the FCC to adopt a friendly attitude toward the telephone company and to encourage a full statement of its objections to the recommendations and criticisms of the Walker report.

"President Gifford of the A. T. & T. asserts that it is 'absurd' for Commissioner Walker to maintain that rates could be reduced 25 per cent without impairing company earnings. If that statement is not true, the company is certainly entitled to expose its inaccuracies.

"By giving the interests concerned an opportunity to state their side of the case freely, the FCC will be in a better position to pass judgment upon the work of its own investigators and much more likely to reach well-balanced conclusions that invite cooperation instead of arousing resentment over treatment that can be construed to be unfair."

More than one hundred newspapers, up to date, are reported to have commented editorially on the Proposed Telephone Report and approximately 95 per cent were critical of the procedure and results of the Investigation Staff findings. Around 75 per cent of the editorials were rather drastically critical of the report, particularly assumption of managerial regulation, while another 20 per cent attacked the ex-parte procedure as their main point. The remaining newspapers were favorable to the findings, although cautious in some cases because the Investigation was one-sided.

Safety Bulletin

In the operation of a telephone system properly applied criticism and fair and just discipline will have a far reaching effect upon all with relation to their following safe practices.

Iowa Commission Upholds Inductive Interference Stand

Upholding their stand originally adopted in 1916, the Iowa State Commerce Commission on April 5 passed a resolution in the matter of the division of expense necessary for elimination of inductive interference on ground return communication circuits where said inductive interference was caused by electrical supply circuits. Their original order of 1916 read in part:"

"If it be found necessary to make the grounded circuit telephone line metallic for part or all of its length in order to remove interference; then the cost of making metallic shall be borne by the transmission line company."

This decision was the answer to the petitions of certain Rural Electric Cooperative Association building rural electric lines in Iowa who asked a rehearing of the Order adopted in 1916. With the resolution was a letter to the Senators and Congressmen of Iowa urging them to vote for the pasage of a bill which has been introduced in Congress to amend the Section 904 of the Rural Electrification Act. The bill; S.3456, H. R. 9458.

Reverting Calls In Automatic Exchanges

Provisions to permit subscribers on the same line to call each other are an important requirement in public automatic exchanges. This article will describe the methods available and the operating practices most widely used. The second and concluding installment will present a review of the principal circuits used for this service.

By FREDERICK L. KAHN

Equipment Engineer, Automatic Electric Company

In any telephone exchange serving party lines, it is necessary to provide facilities for subscribers on the same line to call each other. Such calls are known as "reverting calls." In manual exchanges, reverting call traffic presents little difficulty, inasmuch as operating personnel is always available to effect such connections. But in automatic exchanges, it is desirable to provide for the handling of reverting calls without the help of operators.

In the United States and Canada, where practically every exchange has a substantial proportion of party lines, automatic installations of either the Strowger or relay type usually include provisions for the handling of reverting calls on a full-automatic basis. Other types of automatic systems do not normally provide for this feature. The purpose of this article is to discuss the various methods of providing for full automatic reverting call service in exchanges of the Strowger and relay types.

In order to evaluate the need for reverting call facilities, we shall first analyze the nature of the reverting call traffic which is rather unique. The total number of reverting calls in an exchange has no direct and consistent relation to the total number of party line subscribers, but is primarily determined by social factors, especially the type of settlement

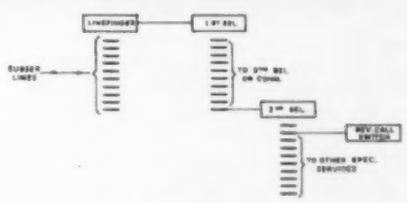


FIG. 1

served by an exchange, or even by each party line.

Party line subscribers living on farms in the country and connected to a long rural line (which may be 15 to 25 miles long and may serve up to 20 subscribers) have a very high "community-of-interest" with other parties on the same line; they

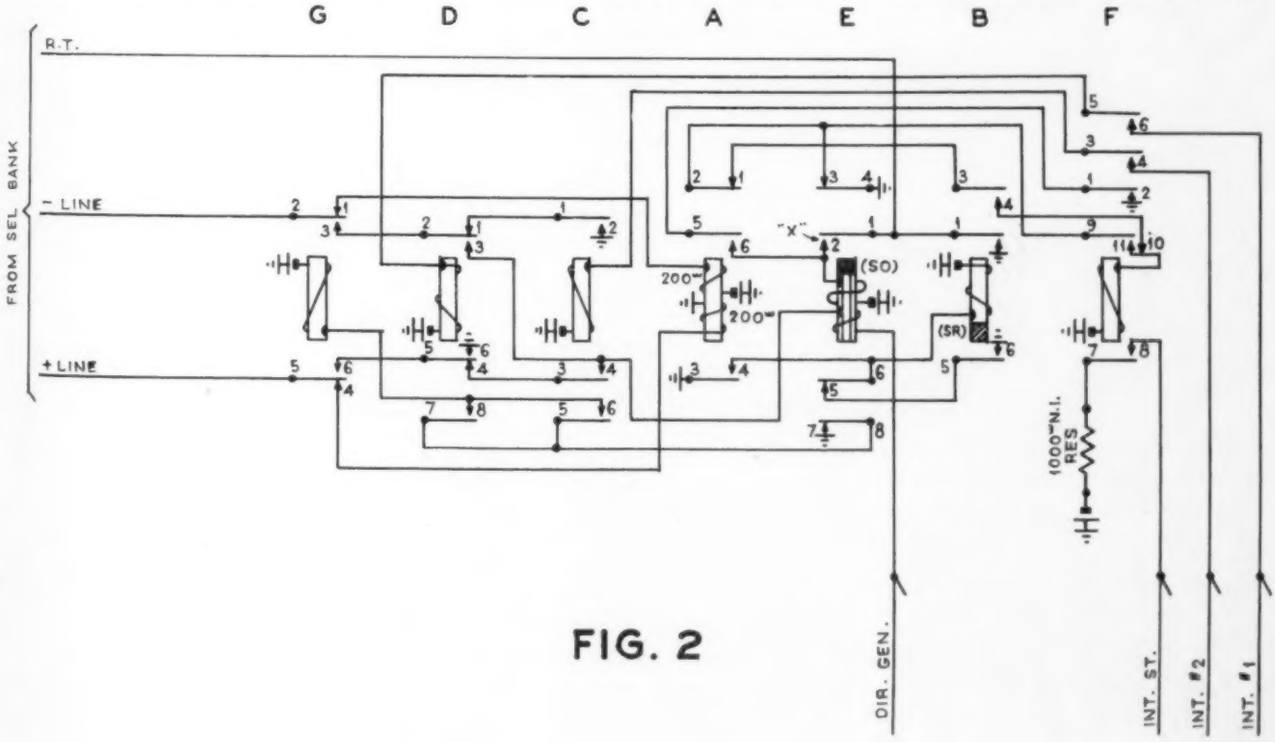


FIG. 2

are neighbors and depend on their mutual assistance in emergencies as well as in many daily routines. This "Brotherhood of the Rural Telephone Line" has been amusingly and dramatically described in a recent article "Eavesdroppers in Eden" published in Scribner's Magazine and reprinted in Telephony of December 19, 1936. On such lines, reverting calls represent a very large percentage of the total traffic. The article referred to also bears out the fact that the lack of secrecy which is characteristic of the American party line, not only is not objectionable to the subscribers, but a distinct asset and much welcomed by them.

In small rural automatic exchanges which may serve a number of such long heavily loaded rural lines, reverting calls sometimes amount to 25% of the total calls. However, when the party lines are shorter, serve 10 or less parties, and when the parties live in or close to a small town, the community of interest of the parties on the same line becomes smaller; reverting calls decrease and intercommunication with other lines increases almost in direct proportion to the factor of closeness to a larger settlement.

In exchanges serving larger towns and cities, the number of parties connected to one line is usually limited to four; these parties live close together, probably within the same city block so that they can meet and communicate readily without depending on the telephone. In large cities, the parties on the same line frequently live in the same building; they often are not acquainted in spite of living under the same roof; but if they are, they rarely will use the telephone for calling one another.

Thus, in spite of serving thousands of telephones on party lines, a large exchange may have a reverting call traffic not greater than that of a small medium sized exchanged. As operators are employed in large automatic exchanges for various services, the completion of reverting calls with the assistance of an operator does not materially add to the operators' load; on the other hand, in the small automatic exchanges, especially those that are unattended, reverting calls are more important and means for completing such calls by dialing, without the assistance of an operator, are an essential requirement.

Methods of making reverting calls

Before discussing the methods by which parties on the same line may call one another by dialing, it may not be out of place to review very briefly the most frequently used systems of selecting different parties on a party line:

a) Code ringing, with ringers of all stations bridged across the line, and all ringers operated when any station is called; coded signals (short and long rings) indicate the station called. This method is especially used on long rural lines for as many as 20 stations per line; the only method used on ground-return lines.

b) Semi-selective code ringing i.e. ringing over the "tip" or the "ring" side of the line, with ringers of half the stations connected between the tip side and ground, and the other half of the stations between the ring side and ground. Only half the number of stations on the line is signaled on any regular call. Frequently used for 10-party lines, also for 20-party lines, but only on full metallic lines.

c) Full-selective ringing, with several different ringing current frequencies, usually five, and tuned ringers in the substations; each substation responding to a different frequency. Up to five parties may have ringers connected across the line without more than one party being signaled when ringing current of one particular frequency is sent over the line; with the ringers connected to either side of the line and ground, ten parties can be signaled on a full-selective basis by sending ringing current of the proper frequency over one or the other side of the line.

d) Four-party full selective ringing with superimposed ringing current i.e. alternating current superimposed on positive or negative battery applied either to the tip or the ring side of the line, and with polarized ringers in the substations, connected to either side of the line and ground.

As secrecy of conversation is not a requirement in the American party line practice, all stations are bridged directly across the line so that with the exception of the ringers and ringer connections, stations on party lines are identical with stations on individual lines.

Normally, only one type of ringing is employed in an exchange; however, occasionally, in medium-sized exchanges, code ringing is used on rural lines, while full-selective ringing is used for shorter lines.

1) "Special number" method

With all these types of ringing, the most widely used method of making reverting calls is to dial a special number, different from the regular directory number of the called party and to complete such calls by means of a "reverting call switch." These switches may be connected to a first, second or third selector level (see Figure 1) or to "switching-through" connector terminals. The reverting call switch is a relay group which usually includes some selecting device (such as a minor switch) for selecting the ringing combination required on the respective call.

The special number to be dialed when making a reverting call consists of the digit or digits needed for access to the reverting call switch ("19" in case of figure 1) usually followed by one or two digits to indicate the ringing combination which consists of the codes or types of ringing current required to ring both the called and the calling party.

After the calling party has dialed the special number in accordance with his instructions (which will be described later), he hangs up. This does not release the switch train, but leaves the calling line connected to the reverting call switch. The latter now changes to the ringing condition, and alternately signals the called and the calling station. (When code ringing is used, and all ringers are bridged across the line, it is sufficient to ring the code of the called station, as the ringer of the calling station will also be operated by it).

When the called party answers, the ringing circuit is tripped so that the ringers at the called and calling station are silenced. This indicates to the calling party that the called party has answered. The calling party can now converse with the called party as soon as he removes his receiver.

Talking battery is usually supplied from the reverting call switch. However in automatic exchanges having line circuits of the "lock-out" type and line relays designed to supply talking battery, the reverting call switch and other switches held during the ringing period may be released, as soon as one party answers; in this case, talking battery is supplied from the line relay. The reverting call switch (or line circuit) is restored to normal when both parties hang up at the end of the call.

If the called party does not answer the call, it is necessary for the calling party to remove his receiver to stop the ring; the connection is released as soon as the receiver is restored.

The ringing of the calling party's station provides a positive indication of the answer of the called party. It eliminates guessing which might cause premature tripping of the ring by an impatient caller, and assures the release of the call by the calling party.

The amount of reverting call switches provided usually is not less than two, even in a small office, and rarely exceeds ten, even in a large office.

In multi-office exchange areas, reverting call switches are provided in each office in order to avoid ringing back over inter-office trunks which would complicate trunk repeater circuits.

2) "Directory number" method

Another method of making reverting calls, also widely used, especially in relay systems, is to dial the regular directory

(Please turn to page 30)

Local Test Desk Operation

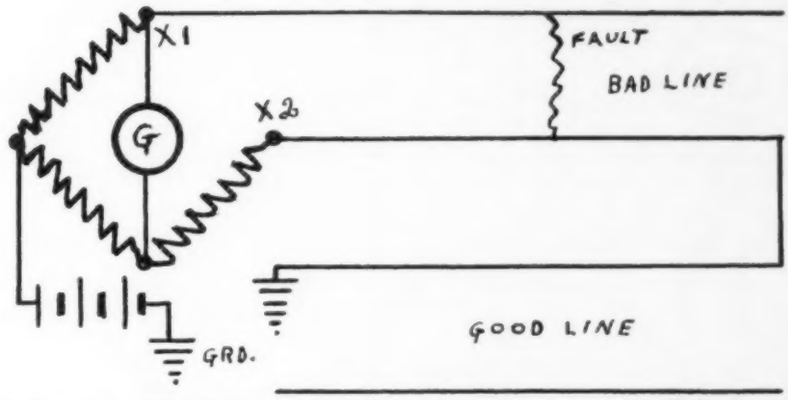
By C. F. CURTISS

Locating Line Trouble By Means of The Wheatstone Bridge.(Ctd.)

IN locating short circuits in a toll or other telephone line, connect the test cords from the Wheatstone Bridge Binding posts "X I and X 2" to the line in trouble. Set the Bridge ratio dial on I and arrange the Bridge switches for taking a loop resistance measurement. Operate the bridge rheostat dials and measure the resistance of the line circuit. The distance to the fault, that is, short circuit, may be calculated as follows: The value of the resistance measurement minus the cable pair (if any) resistance divided by the known loop per mile resistance of the toll line wire, or D=R—C/L M, where "D" equals distance in miles from the cable terminal pole to fault. "R" equals measured resistance in ohms to the fault. "C" the resistance of cable pair to the terminal pole, and "L M" the known resistance per loop mile of open line wire.

Example: The loop resistance measured to a short circuit in a 104 copper toll line is 86 ohms and the cable conductor loop resistance from the central office to the cable terminal pole (point of contact with the open toll line wire) is 17 ohms, then D=R—C/L M, or 86—17=69/10=6.9 miles to the fault from the cable terminal pole. In this example it is assumed that the resistance of the short circuit or fault itself is zero. See Chart 1 for loop resistance values. In the foregoing example if the resistance to the fault had not been zero, but had actually been 9 ohms, the series resistance to the fault would have been 86—9=77 ohms, and the calculation would be 77—17=60/10=6 miles from the cable terminal pole, or approximately one mile nearer than the actual location of the fault.

● In order to determine whether or not a short circuit in a line circuit is a light short, that is, the two line wires are not making good electrical contact or zero resistance, a measurement should first be made with the distant central office end of the short circuited



toll line open. The distant end should then be short circuited and another measurement made. If the two results are the same, the resistance of the short circuit is zero. If the second measurement is less than the first, the resistance of the short circuit has a definite value, and the method of calculating it's location must be modified to allow for this fact.

The location of a short circuit which has a certain amount of resistance can be made by making Bridge measurements one will be too near to the home central office and the other measurement too far away, or the true location to the fault will be halfway between the two calculated locations.

Another way of locating short circuits is by means of Blavier's method and consists of two Bridge measurement, one with the distant end of the line in trouble open, and the second measurement is taken with the distant ends of the two wires connected together, then

$$D=R2-\sqrt{(R_1-R_2)\ \frac{(N_1+N_2\ L-R_2)}{2}}\ /N_1+N_2.$$

Where "D" equals distance in feet or miles to the fault from point of test, "RI" resistance between the two conductors measured when the distant ends are open, "R 2" resistance when the distant ends of the wires are connected together "N 1" and "N 2" the resistance per foot or mile of the two conductors respectively, and "L" the total length of both wires in feet or miles.

● Suppose a 104 copper toll line 30 miles long is short circuited and a Bridge measurement is taken with the distant end of the line open and a reading (RI) of 389 ohms is obtained. Next a Bridge measurement is made with the distant end short circuited and reading (R2) of 242 ohms is obtained, then

$$D=R2-\sqrt{(R_1-R_2)\ \frac{(N_1+N_2\ L-R_2)}{2}}\ /N_1+N_2,$$

or $D=242-\sqrt{(389-242)}=147\times(5+5=10/2=5\times60=300-242)=8526$. $\sqrt{8526}=92$, and 242—92=150/10=15 miles to the fault.

Owing to the probability of error short circuits in toll lines should preferably be located by means of the loop and Varley measurement, rather than with a straight resistance measurement through the fault, as greater accuracy is obtained with the Varley.

In locating short circuits with a Varley measurement, one side of the "bad" that is, short circuited line wire, should be connected to one side of a "good" that is, another line wire paralleling the "bad" circuit to the distant central office to form a loop, the other side of the "bad" wire should be grounded

Toll Line Hard Drawn Copper Wire

N. B. S. Gauge	Diameter In Mills	Resistance Per Mile At 68°F.	Resistance Per Loop Mile At 68°F.
10	128	3.286ω	6.572ω
12	104	4.986ω	9.972ω
14	80	8.416ω	16.832ω

"BB" Galvanized Iron Line Wire

B.W.G. Gauge	Diameter In Mills	Resistance Per Mile At 68°F.	Resistance Per Loop Mile At 68°F.
10	134	22.056ω	44.102ω
12	109	33.316ω	66.632ω
14	83	57.456ω	114.912ω

Note: The resistance values in this table are given at 68 degrees Fahrenheit. For temperatures above 68 degrees add 0.002 to the resistance listed for each degree, and for temperatures below 68 degrees subtract 0.002 from the resistance values listed for each degree below 68 degrees. Example: What is the resistance of No. 12 iron wire per mile at 60°F. 33.316—0.002×8=33.3 ohms.

Chart No. 1

and a Varley measurement made as for a ground. In making this test care should be taken to obtain a "good" line of the same gauge and kind of wire as that of the bad line.

The resistance to the fault may then be calculated by the Varley formula: R=L—V/2. Suppose a loop resistance of 240 ohms, and a Varley of 40 ohms are obtained, then R=L—V/2 or 240—40=200/2=100 ohms. The distance to the fault is obtained by dividing the 100 ohms by half of the known loop resistance per mile of the line wire in trouble. The formula can also be arranged to read R=B L—A V/A+B, where "A" and "B" are the Bridge ratio arms, "L" equals the loop resistance, "V" the Varley measurement, and "R" the resistance to the fault. For example: In the preceeding problem the loop resistance is 240 ohms and the Varley 40 ohms, and say that the ratio or A/B was 10/10, then R= B L—A V/A+B, or 10×240=2400 and 10×40=400. Then 2400—400=2000/(10+10=20)=100 ohms.

The result of a Varley loop measurement can be checked as follows: Suppose the loop measurement of a line circuit in trouble is 300 ohms and the Varley measurement is 50 ohms, then, the resistance of the line wire connected to the Bridge "X2" binding post to the fault is 300 minus 50 divided by 2 equals 125 ohms. The resistance of the wire connected to the Bridge "XI" post (the wire having the greater resistance of the two) to the fault equals 300 ohms plus 50 ohms divided by 2 equals 175 ohms. Then the sum of the two values, that is, the first sum plus the second should equal the resistance of the loop, which in this example 125 ohms plus 175 ohms equals 300 ohms.

● Crosses between two line circuits can be located as follows: Have the distant end of one of the crossed lines short circuited, then with both sides of the other crossed line opened at the distant end, connect the Bridge test cords designated "XI" and "X2" to the short circuited crossed line and measure the loop resistance. Connect another test cord that is connected to one pole of the Bridge battery, to the crossed line that has been opened at the distant end. Arrange the Bridge to make a Varley measurement and measure the resistance to the cross. The distance from the testing point to the fault (cross) is calculated in the same manner as given for locating a ground.

Opens in line circuits can be located with the Wheatstone Bridge, but generally results of the measurement obtained are not sufficiently accurate without the use of expensive additional apparatus necessary to properly perform the test. However, a "Listening Test" will usually give the testman an idea as to the location of an open by listening on both sides of a line circuit, one side of which is open, with a grounded head receiver, or the test desk telephone set, and comparing the line induction on both sides respectively to grounds which is approximately proportional to the length of the open line under normal conditions and provided that there is no high voltage interference at an yone particular place.

Since the testman is concerned only with the resistance of the toll line conductors of the particular circuit in tests such as described in the foregoing he should be very careful that the incidential work performed to obtained the Wheatstone Bridge measurements does not introduce errors which are liable to cause the toll trouble lineman to needlessly travel out of his way to find the fault.

● One thing of importance to consider relative to this, is not to be in too much of a hurry when measuring a fault, as that is one job at which the testman should be deliberate in order to insure accurracy of location. Another item of importance is, that when a "short" is put on at any point along the line as part of the testing proceedure, that care is taken to make certain that the resistance of the "shorts" does not affect the results of the test, that is, the put on "short" should be of the nature commonly called solid.

A short put on a line for the purpose of making a test if not placed with considerable care could contain sufficient resistance and produce a condition which would result in not obtaining a true value of the line resistance. Loose connections in a put on "short" at the distant central office also could give such a condition.

In addition to all this, in order to locate toll line trouble most accurately, the testman should have suitable records which will give for the various circuits, detailed information about their makeup. These records should furnish information relative to the gauge and milage of open line wire and other electrical characteristics of the circuits, also information concerning irregularities in construction, and the resistance of other parts of the circuits, such as the portion of toll entrance cable conductors, intermediate cables etc. The records should also furnish such information as to the location of cable terminal poles, test stations, pole numbers, especially near road crossings, junction points, and other items which might be of assistance in directing the repairman to the trouble.

BOOK REVIEW

"MATHEMATICS FOR RADIO AND COMMUNICATIONS"

By George F. Maedel

Described as a "post graduate" course in mathematical methods. Provides a complete but simplified training in the algebra, arithmetic, plane and solid geometry used in solving telephony, radio and other communications problems. Also useful to engineers as a compact reference manual in the quick, accurate solution of communications problems involving mathematics. Contains hundreds of short-cuts.

This new book by the head of the Radio Frequency Engineering Department of the R. C. A. Institute, has just been placed on the market by Prentice-Hall, Inc., and is announced for the first time in an advertisement in this issue. All telephone men should find this book very valuable.

—Courtesy Bruner-Ritter

Act XI

Showmanship in Business

by

ZENN KAUFMAN

Put The Audience On The Stage

ONE of the few innovations in the whole world of entertainment was discovered by Burlesque when they built a runaway that allowed the dollies to scamper into the audience and pull the ears of the cash customers. A little bit unrefined, perhaps, but fundamentally sound since it helped bring the show closer to the audience. Or, more important, the audience closer to the show. And stage.

In a previous story I ventured to say that the man who buys the ticket is the hero of the show. Barrymore may get the salary check. Braddock may get the newspaper headlines. Benny may get his name in bright lights on Broadway, but the real stage star, ring hero, or screen idol is not the actor but *the individual member of the audience.*

● Similarly in business. The hero of the selling drama is the customer—or prospect. His vanities—his hopes—his fears—his ambitions—these are the stuff from which your plot is spun. And on *him*—and him alone—must the spotlight shine.

The simplest commercial example I know is the auto salesman who makes the prospect sit at the wheel of the car. Or, better yet, drive it. Or the desk salesman that places a full size mirror on the wall facing a $110 desk. Then gets you to sit behind the desk—facing the mirror—so you can behold yourself, flanked on either side with expensive fountain pens, in all the glory of big business. A man *needs* a $110 desk. This story, which isn't so bad, is being written on a $1.95 bridge table. With one broken leg. Not that it couldn't be a better story—but an extra investment of $108.05 wouldn't help. But the man who looks in that mirror says "Boy! You look like Charlie Schwab!" And buys the desk.

● I'm no exception. I spoke in Toronto recently for an advertising club, and having heard much about woolen tariffs I thought I'd buy an overcoat and save some money. I went to Eatons (beautiful store) and picked out a nice coat at $29.50. Priding myself on saving money—I started to chat with the manager. He began to give me the works. He told me about the tradition in British fabrics—how down thru the years father had taught son the unwritten secrets of woolen craftsmanship—how families had worked for generations at the same looms—that I might be rich as Croesus yet couldn't buy as fine a cloth in U. S. at any price! He sold me a $39.50 coat. He took up generation by generation—five generations at $2 per each—to $39.50. And now I'll wear that coat in the States—and stroke it tenderly as I say to friends "Yes—no one makes clothes like the British." And for a brief moment—I take the spotlite—as the hero.

THE same principle works in your advertising. In a previous story we told how at the Southeastern Fair in Atlanta, Ga. over 13,000 waited to hear *their own* voices over the voice mirror. We also mentioned how a whole community was flattered when a phone company sent out investigators to ask 30,000 women: "How can we improve our service?"

Use this principle in windows. You have to do something to break the invisible wall between you and the customers' heart. The window glass, nearly invisible (and sometimes entirely so) keeps out rain and dirt. But a stronger force—known as indifference and inertia—keeps out customers. You've got to "put the audience on the stage." You have to do something that builds that runway right out into the street. Mosland Rugs did it by placing a carpet on the sidewalk—let people walk over it for a month—then cleaned it, put it in a window. In San Francisco, the Pacific Tel. & Tel. Company used a window display called the *"TALK OF THE TOWN."* An electric clock and meter dial tells the observer how many telephone conversations are going on at "this instant" over telephones served by the central office to which the display is connected.

● This same idea works in handling merchants who are prospects for extra lines or extensions. Don't approach them on the basis of "How can I get twice as much business from you," but rather on *"How would you like to double your telephone order business?"* Then show him how you can help him do it.

Telephone employees appeal to the hero instinct of husbands when they sell phones "To save wives the work and inconvenience of long shopping hours. In order to please their subscribers the Lincoln Tel. & Tel. Company in Nebraska instructed their operators to put a "personal interest note" in their voices.

The American Radiator Company prepared a "Telephone Presentation Outline" to help their telephone solicitors get appointments with prospects. The outline shrewdly advises operators to call the prospect by name several times during the conversation.

Give your salesmen a chance to take a bow. In "How to Win People To Your Way Of Thinking," Dale Carnegie relates an experience that Charles Schwab had with a mill manager whose men

(Please turn to page 38)

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1. **Conveniently Located Warehouses**
2. **Intelligent Analysis of Requirements**
3. **Every Order on a Rush Basis**
4. **Unsurpassed Quality**
5. **Outstanding Dollar Values**

Your construction work is only as good as the material you use. Your men may be "tops" in experience—fast, capable workers—yet if they have poor tools to work with and materials that aren't up to par, much of their time and effort will be wasted.

This is just another way of saying that in telephone construction, it pays to use only the best—especially when you can get the highest guaranteed quality at the low prices we are now quoting.

These two factors are always important —high quality at low, competitive prices. Our large volume of supply sales enables us to buy standard, nationally-known merchandise at quantity prices—and we pass the savings on to you in outstanding dollar values!

Then add these advantages—our four conveniently - located, completely - stocked warehouses—each one manned by experienced telephone men who know what you want and who take special care to see that you actually get it—the elimination of red tape so that every order goes through on a rush basis—and you have our 5-point formula for completely satisfactory supply service!

We believe we've left no stone unturned to give you the materials, prices and service that you've always wanted. Won't you try us on your next order and see if you agree?

AUTOMATIC ELECTRIC

MAKERS OF TELEPHONE, SIGNALING AND COMMUNICATION APPARATUS
ELECTRICAL ENGINEERS, DESIGNERS AND CONSULTANTS

Distributors in U. S. and Possessions:
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Export Distributors: AUTOMATIC ELECTRIC SALES CO., LIMITED

Reverting Calls in Automatic Exchanges

(Continued from page 24)

number of the called station which establishes the reverting call through the regular connectors. However, the calling party, after dialing the number, must hang up. The connector, on such a call, will find the called line busy as it is the line from which the call has originated; hence, the connector circuit must include additional relays to discriminate between the "line busy" condition on a regular call and that on a reverting call. In the latter case, the connector is not released when the calling party hangs up, but changes to the ringing condition and rings the called party.

As the regular directory number has been dialed, with no indication of the calling party, the provisions for signalling the calling party are limited. In case of code ringing, with ringers of both parties bridged across the line or connected to the same side of the line, the calling party's ringer will operate when the called party is signaled. When the ringer of the calling station is connected to the opposite of the line from the called station, a special "revertive ringing signal," different from any other code used for regular calls, can be connected to the calling party's side; in either case, the calling party will receive a distinct indication when the called party answers.

With full-selective ringing, however, the calling party cannot be rung so that he receives no indication that the called party is being rung nor that he has answered; he is not sure when he should remove the receiver expecting to find the called party on the line. As the calling party in this case is not forcefully reminded to release the connection if the called party does not answer, the connectors should be arranged for automatic release, after a predetermined time, in case of unanswered calls, to prevent prolonged ringing.

This type of reverting call service is usually supplied in small exchanges with "lock-out" line circuits. When the call is answered, the connector is usually released, and talking battery supplied from the line relay. However this combination of circuits is by no means necessary. If a simpler line circuit is used, the connector, upon answer by either party, can be held until the conversation is completed, talking battery being supplied to both parties from the regular "back-bridge" of the connector; in this case, the connector is released when both parties hang up.

With either method of reverting calls, the possibility exists on full selective lines that the ring is tripped in, advertantly by a third party taking the receiver off while a reverting call is in progress. When this happens, the calling party may receive a false indication that the called party has been answered. This, however, is not frequently experienced, and is one of the interferences with a call in progress that may be expected on any party line.

The facilities described thus far for making reverting calls are also used for making calls between main and extension stations on either individual or party lines as well as for testing the ringers of a station when a repairman inspects or repairs a substation ("inspector's ring-back"). The latter use of the reverting call equipment relieves the test desk; for this reason, a simple reverting call switch is sometimes provided in large private exchanges or in public exchanges serving no party lines.

3) Other methods

Local battery operation is sometimes used on long rural automatic lines and provisions are made for making reverting calls with the hand generator that is retained in the local battery telephones for this purpose. This method requires special facilities (hook latch or push-button) in the telephones or a special line circuit to prevent operation of the switches in the exchange when the hand generator is operated. Due to the limited use of this method, it will not be discussed in more detail. A special line circuit for such a system will be described in the circuit section.

In some European countries, especially Switzerland and Italy, ten-party line service has recently been introduced on a small scale for serving long lines in thinly populated areas, or for giving service to a few subscribers in small communities that have no exchange. In view of the European insistence on secret service, such lines require very special equipment, both in the exchange and in the substations. The latter usually include a small selector relay which determines the station that is connected to a line on any call, and other control relays to assure the selection of the station and secrecy of conversation.

Reverting call facilities are provided with some systems of this type and are usually incorporated in the special line equipment associated with each line. Small switches of the rotary type or selector relays, which are part of the line equipment, record the digits dialed without interfering with the progress of a call. When the digits stored on these switches indicate the call is a reverting call, the regular switch train is released and the called station is rung from the special line equipment without the calling party hanging up. This is accomplished by ringing over one side of the line and is possible because only one ringer can be connected to the line at one time i.e. the ringer of the called station.

Comparison of methods used

The ideal reverting call practice is the one last described. It permits the calling party to make a reverting call in exactly the same manner as any other local call. In fact, he does not even need to know that the called party is on his own line. This feature is incidental to the requirement for secrecy of conversation; the special station equipment and the very expensive line circuits used with these party lines would not be justified merely to simplify reverting calls. The expense of this type of equipment prohibits a low commercial rate for party line service. As low rates for party line service are responsible for the widespread use of the

Safety Today Keeps The Doctor Away

By B. E. Hardin

Safety straps and body belts are made for safety. Use yours when getting in or out of cable buggy, but be sure to use approved buggies at all times. Don't ride strand with your safety strap; there is no comfort and very little safety.

Don't forget to always face your Pike when taking it down from a pole after straightening pole. Never put your pike on shoulder with back turned to pole and attempt to pull pike out of pole by walking off. You can't balance pike in doing this which also endangers fellow workers.

Falling off a ladder is not the only way to use safety. As for assistance in carrying ladders when doing city work because of danger of breaking plate glass windows or neon signs. City folks sue at the drop of a hat.

Remember your hand line. No item should be thrown to lineman on the pole. This equally applies to lineman who should never drop tools or materials. The hand line with its bucket offers safety to everyone.

STOP OLD MAN ACCIDENT NOW FOR EVERYBODY'S GOOD.

telephone in North America, we must turn our backs to this uneconomical but otherwise perfect method, and concentrate our attention on the two methods most widely used in the United States.

The method which permits the regular directory number to be dialed on a reverting call, has considerable appeal on account of this fact. However, it has actually the same short comings as the method requiring the dialing of a special number: the calling party must differentitate between regular and reverting calls, and must be instructed on the special method of operation for making such calls. These instructions must clarify two points: how to find out that the called party is on the same line, and how to make such a call. As a special procedure is necessary with either method, the dialing of a special reverting call number is probably as readily understood by and less confusing to the average subscriber than the other method with which the busy signal requires a different interpretation when he calls a station on his own line.

The principal advantage of the "special number method" is that with all types of ringing the calling station is signalled and receives positive information of the progress of the call. The principal advantages of the "directory number method" are that the use of the regular connectors provides more reverting call facilities than a limited number of reverting call switches: and that no selector level or connector terminals need be set aside for reverting call traffic.

(TO BE CONTINUED)

State Associations Discuss Inductive Interference

Texas Association again selects Oscar Burton as president. Exhibits by Manufacturers feature of all state conventions

Finding inductive interference as the main topic of discussion, the conventions of the various state Associations are in full swing. Both the Texas Telephone Association and the Oklahoma Telephone Association devoted much time and thought to this timely subject.

At the Texàs meeting in Dallas, sessions were held at the Adolphus Hotel for the first time in many years. The advantage of having exhibits on the same floor with the sessions was most pleasing to exhibitors and members. A banquet, floor show, and contest for the "Voice with a Smile" was the highlight of entertainment prepared by the program committee headed by Oscar Burton, president, and George B. Butler, secretary. Attendance of many out-of-state visitors spoke well for the program. Included were John H. Agee, Louis Pitcher, and C. C. Deering, president, vice president and secretary

Oscar Burton, Tyler, Texas, Long time president of the Texas Association was re-elected

respectively of the U. S. Independent Telephone Association. All Texas officers were re-elected for the association year.

At 2:00 o'clock, March 23, the Convention was called to order in a general session by the president, Oscar Burton. The first item of business was the Secretary's report by George B. Butler, in which a full analysis of the work of the previous year was given. Mr. Merton Swift, San Marcos, Texas, Treasurer, gave the financial report for the year which was very encouraging, showing a balance on hand as of February 1st of $1,769.29. President Burton then gave an oral report on the Association activities and how it had assisted the National Association in having legislation introduced in Washington, which, if passed, would be of great help to the rural telephone people not only of Texas but of the nation as a whole.

Mr. C. C. English of the Southwestern Bell Telephone Company discussed Legislative problems in which he pointed out many angles of importance to telephone people over the State, and the importance of assisting the Legislature in letting it know about the telephone problems.

The next day the assemblage heard talks by A. G. Davis of the Southwest Telephone Company, Brownwood; Joe K. Wells, Austin; Louis Pitcher, Chicago, who spoke on National affairs; and Carl Moore of the Dallas News, who demonstrated phone pictures. Re-elected as directors were T. P. Bearden, Oscar Burton, R. S. Martin, A. L. Robb, John Y Rust, Ralph Sparks, J. E. Stuart and Merton Swift. New directors named were Arthur Schmidt and Fred Trower. During the after-

R. B. Fairly, recently elected president of the Southwestern Associated Telephone Co., also re-elected second vice-president of the Texas Association

Stromberg-Carlson's T. C. Thompson (left) and Cook Electric's Chester Ruth (right) are "making news" by listening instead of talking to R. B. Fairly, prominent Texas telephone man, during Texas Convention

noon conferences were held on all subjects with no general session scheduled.

The banquet was featured by the voice contest won by Miss Ruby McKee, Gulf States Telephone Co., Kaufman. Voices were judged by applause registered on applause machine. A floor show was then presented.

On the closing day, March 25, the meeting heard P. P. Cheathen, toll supervisor of the Southwestern Bell Telephone Co. E. B. Jennings of the same company discussed the effect of electric lines on telephone subject during which he displayed a map of Texas showing all REA projects in the state. Resolutions passed included one commending and endorsing quick action of Senator Morris Sheppard in the introduction of Senate Bill 3456, and the Hon. Morgan Sanders in the introduction of a companion bill in the House, either of these bills, if passed, will remedy the evils of inductive interference.

The Oklahoma Convention

Convening at the Huckins Hotel, Oklahoma City, March 29 and 30, the Oklahoma Telephone Association was officially opened by C. E. Devin, Apache Telephone Co., president, who reviewed the Association year. The report of H. W. Hubenthal, well known secretary of the Association, included the details of assistance rendered the members and especially stressed the value of the Association when inductive interference was being considered.

The golf tournament scheduled for the day preceding opening day was rained out. A banquet and entertainment was held Tuesday night. M. A. Sander was presented with a gladstone bag by the Association.

Officers elected were C. E. Devin, Apache, president; J. M. Nelson, Skiatook, 1st vice president; Mills Roberts, Waynoka, 2nd vice president; H. W. Hubenthal, Oklahoma City, secretary; and M. A. Sanders, Oklahoma City, treasurer. All directors were re-elected with the addition of F. S. Christman, Okeene.

Speakers included Louis Pitcher of Chicago; Oscar Burton of Texas; Mrs. Blanche Bohling, Southwest Telephone Co., Purcell; A. G. Davidson, Southwest Telephone Co., Brownwood, Texas; J. A. Smith of TELEPHONE ENGINEER; Jasper M. Allen, South western Bell Telephone Co., Oklahoma City; Samuel Tucker, president of the Kansas Association, and C. P. Thompson of Oklahoma A & M College.

E. F. CARTER
General Manager of the Missouri Telephone Co., Columbia, was re-elected President of the Missouri Telephone Association, Missouri

Missouri Meeting

The meeting of the Missouri Telephone Association on April 4 and 5 was held at the Hotel Muehlebach, Kansas City, with over 300 registrations. Discussions covered inductive interference, taxation and the national outlook on further taxes, impending legislation, and traffic and plant matters.

Much credit was given the manufacturers and suppliers for their most instructive exhibits as almost 30 of these firms were represented. The many speakers heard were unusually well received and a very successful convention was reported.

Re-electing E. F. Carter of Columbia, as president, the Association also selected as other officers: A. M. Benedict of Richards, first vice president; W. R. Journey of Higginsville, second vice president; T. R. Schweer of Rolla, third vice president; Elmer Weakley of Plattsburg, fourth vice president, and R. W. Hendrick of Jefferson City, secretary-treasurer.

The opening session heard President Carter in his annual address in which he pointed out the many problems and their possible antidotes now facing Missouri telephone men. He also traced state commission actions taken after the problem of inductive interference made its appearance with its controversial reverse of policy by the REA in regards to cost of eliminating this interference, thereby throwing the burden on companies that could ill afford the expense. Also heard was Ralph E. Duffy of the Missouri Public Service Commission.

Ralph Van Trine of Ft. Wayne, president of the Telephone Management Company presented an address

H. W. Hubenthal, Secretary
Oklahoma Telephone Association

on "Present Day Problems of the Telephone Business." Louis Pitcher, executive vice president of the U. S. Independent Telephone Association also addressed the convention on "National Affairs." R. W. Hedrick secretary treasurer of the Missouri association, who was re-elected, gave a brief report of the association year.

A. B. Chase, Jr. district traffic chief of the Southwestern Bell Telephone Co., Kansas City, addressed the meeting on its second day. Following, H. B. Whatley of the same company gave a demonstration of much interest on exchange and toll operating. The conference on plant and maintenance held under the supervision of John J. Cline of Sullivan was one of the most instructive our correspondent ever attended. Resolutions were passed regarding inductive interference with copies of resolution being ordered sent to all legislative agencies as well as to Administrator Carmody of the REA.

Carl A. Kraege Manages Kansas Property

Selection of Carl A. Kraege, well known telephone man, to actively manage properties of the Eastern Kansas Telephone Company recently acquired by the McKrae Telephone Company, was announced in March. The purchasing company has as its president E. Tom Thompson, of Topeka; vice president and treasurer Mr. Kraege, and Thornton C. McCune, Chicago, as secretary.

Carl A. Kraege

Carl Kraege brings to the combine an experience gained in all phases of the telephone industry. In his High School days in Boise, Idaho, his summer vacations were spent on construction crews, and later after war service with the Marines, he continued this plan to finance his higher education while attending the University of Wisconsin. He included study at the U. S. Naval Academy at Annapolis, as part of his training.

Having experience in telephone appraisal work, directory advertising, and many other phases in the industry, his experience also included work in the offices of the Kansas Independent Telephone Association. He later served the American Telephone Advertising Company and still later the Kansas Telephone Company. It was at this time that Kraege affiliated with the then Associated Telephone Utilities Co., now the General Telephone Corp. whom he served in a number of years.

Severing this connection to become sales manager of L. M. Berry & Co., well known directory concern, in 1933, he served that company until 1937. With Mrs. Kraege, he has moved to Burlington, Kansas, to make his home.

The exchanges operated by the Eastern Kansas Telephone Company and covered in the purchase by the new management are Fredonia, Altamont, Altoona, Coyville, Lafontaine, Toronto, Quincy, Piqua, Neosho Falls and Benedict, besides Burlington which will be headquarters for the company. Mr. Kraege announces that no changes are contemplated in the local management of the various exchanges.

Catolog No. 31 has been mailed. If you wish one, send a postcard and your copy will be mailed promptly.

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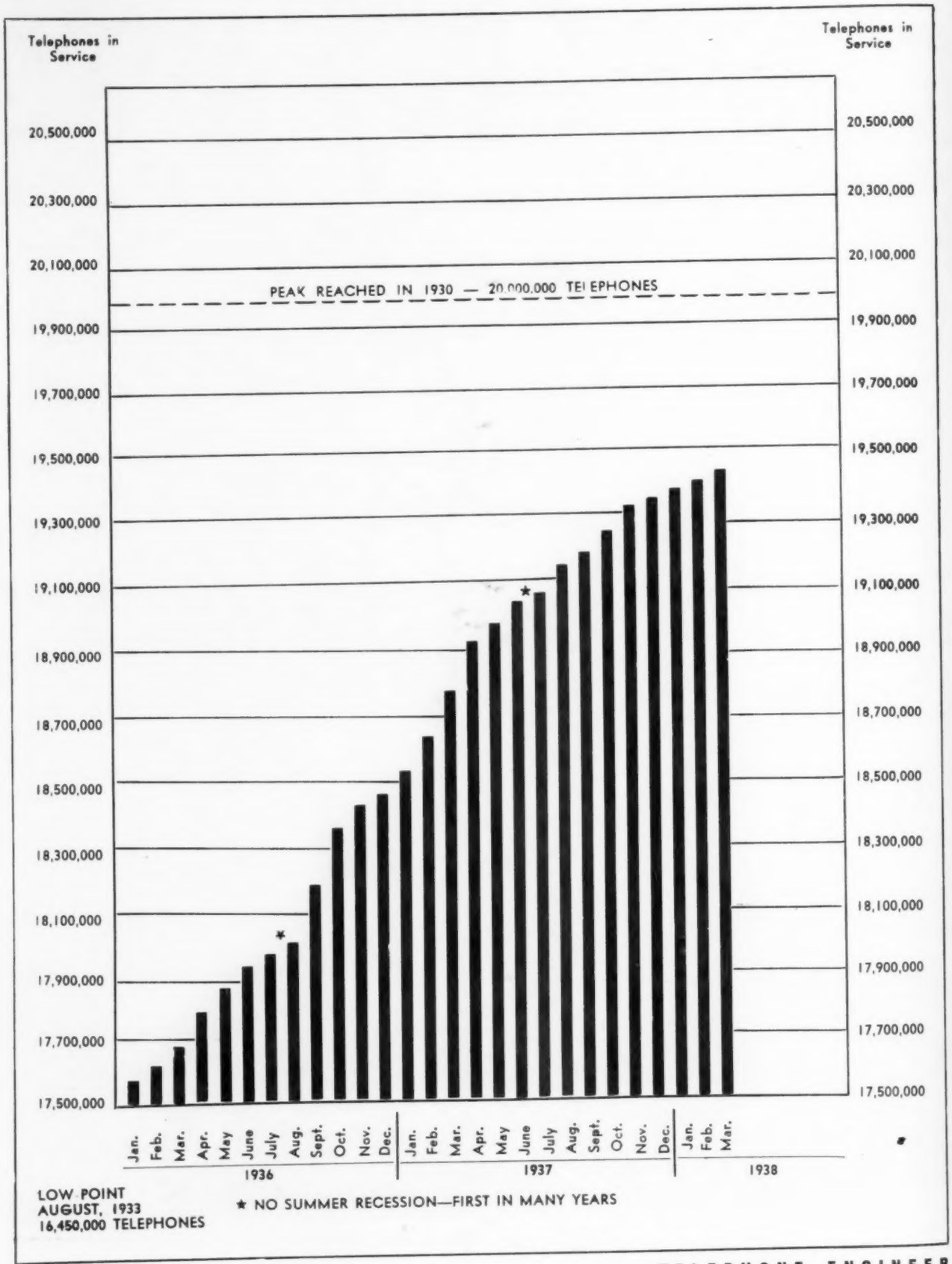

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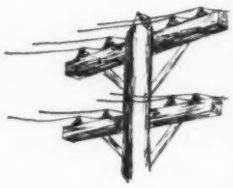
R. A. Clark, Jr.



Facsimile Message Transmission

A few months ago (TELEPHONE ENGINEER, February 1938) we mentioned the use of facsimile for message transmission. While there is no low cost equipment developed especially for high speed message transmission, the radio industry has equipment about ready for the market which can be adapted in principle to wire transmission without appreciable modification. This equipment will be simple in operation and relatively inexpensive. It is expected that the receiving units can be manufactured for less than $50.00; the transmitters should not be appreciably more than this. The cost of paper for use in the receiver is relatively inexpensive being no more than ordinary bond.

For those of you who are not familiar with this new development a short description of facsimile broadcasting will be of interest. The service will form an adjunct to the newspapers in that it will bring to subscribers up to the minute news and incidentally also advertising. The facsimile receiver will be attached to an ordinary broadcast receiving set which can be tuned to the broadcasting station from which the facsimile is desired. The service will start in the early morning say around two o'clock and continue for several hours. An arrangement will be provided on the radio receiver to automatically turn the set on and off so as to receive the news broadcast.

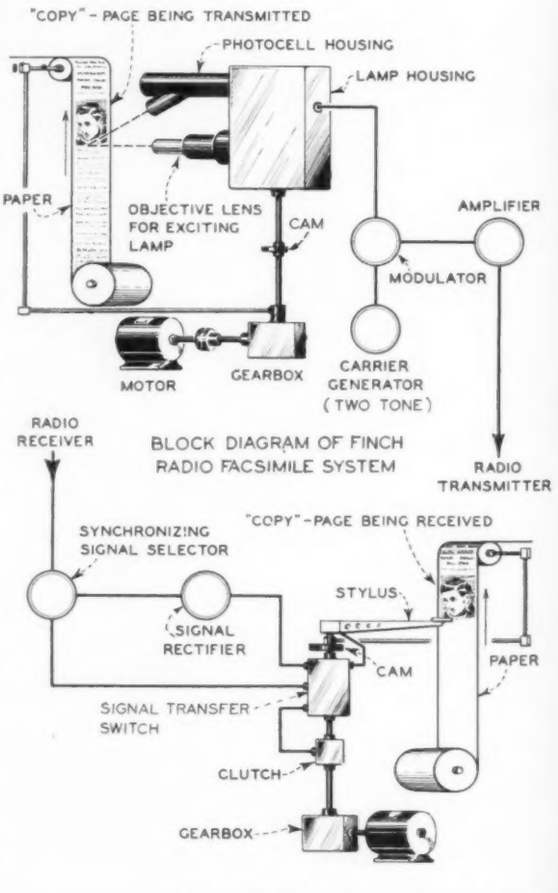
Inasmuch as the standard radio broadcast receiver can be used the cost of introducing facsimile into the home will be very nominal, and there should be considerable popular appeal in having news flashes available at the breakfast table. Several newspapers have evidenced keen interest in the device and licenses have already been issued to several radio broadcasting stations for experimental transmission of news and pictures.

One of the pioneers in the development of facsimile for radio broadcasting reception is W. J. H. Finch who has organized the Finch Telecommunication Laboratories in New York City. His equipment is typical of that being developed by various manufacturers and I am sure a description will be of interest. Figure 1 shows a diagrammatic sketch of the apparatus. The transmitter consists of a scanning device comprising a light source and a photocell. This converts the light waves reflected from the copy to electric vibrations which control or modulate a carrier wave. At the present time a carrier frequency of about 3,000 cycles is being used. The modulated carrier signal is amplified and broadcast by the radio transmitting station.

The modulated 3,000 cycle signal upon being picked up by the radio receiver controls a synchronizing selector which in turn operates the recording mechanism. This mechanism consists of a stylus which sweeps back and forth across the paper. This stylus has a pen point which is connected to the signal rectifier. The paper used in the receiver is sensitive to voltage so that signals will be reproduced on the paper.

While the facsimile equipment developed for radio broadcasting will obviously not be suitable for wire communication the fundamental principles will apply with slight modifications. Many of the parts can be used, thus effecting economy in manufacture. The present recorder can be operated at speeds of around 75 words per minute. With suitable modification there is no reason why this speed cannot be increased so that typewritten words can be sent in the neighborhood of 200 or more words per minute.

(Below) Fig. 1. Schematic arrangement of radio broadcasting facsimile equipment



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Line and Desk

RAY BLAIN, Member A.I.E.E., Editor

Q. What different voltage switchboard lamps can ordinarily be obtained?

A. Switchboard lamps can ordinarily be obtained in voltages ranging from 3 to 55 volts.

Q. How can a large screw driver be safely carried in a linemans belt?

A. One good way is to use a plier holster which is equipped with a special compartment to carry a screw driver.

Q. What type kettle is recommended for heating of insulating compound?

A. We would recommend the use of a special, double-jacketed compound kettle. The double-jacket prevents explosions. The special spout on these kettles are convenient for pouring the compound.

Q. When is it necessary to use an "H" fixture on a toll line?

A. These fixtures are generally used for storm guying or to meet some special condition. These fixtures have the additional advantage that they will hold a heavy strain without side guying.

Q. Is it considered desirable to make local repairs on small electric soldering irons?

A. This will depend on the nature of the fault though local repairs can generally be made successfully. The points and heating elements are usually the only parts which go bad and these are generally easily replaced.

Q. What type and kind of paint should be used to refinish cable covers?

A. The rust, if any, should be first removed and the metal covered with some good paint recommended for this purpose by any reliable paint company. We prefer a good grade of aluminum paint for this purpose.

Q. What satisfactory means can be used to place defective cords out of service without removing them from the switchboards?

A. We would recommend the use of the approved type trouble sleeve. This is a fibre sleeve split to accommodate various sizes of plugs. These are inexpensive and neat, also convenient to use.

Q. What test can be made on subscribers lines to detect low transmission?

A. A small inexpensive unit can be procured which will artificially lengthen the talking circuit approximately 20 decibels. This unit can be easily connected into the circuit by a key on the test board. This loss will cause defects to show up on a line which otherwise would not be easily detected.

Q. How can a lead sleeve be attached to a messenger for pulling a cable through it?

A. The sleeve can be lashed to the messenger ties around the outside or by placing a wire through the center of the sleeve and attaching each end to the messenger. In any case the sleeve should be in line with the pulling-in line so that the cable can slide through the sleeve without catching.

Q. What type binder or hitch can be used to hold poles firmly on a trailer?

A. We are successfully using a small chain hoist for this purpose. A short length of messenger strand with an eye in each end is wrapped around the poles and tightened with the chain hoist. After the poles have been hauled a short and get set the hoist may be tightened and will then hold the poles firmly in place for the duration of the trip.

Q. What type shelter is recommended for use of a cable splicer while working on aerial cable?

A. We would recommend the use of a regular cable splicers tent. These are generally made of 10 Oz Army cotton. The roof is spread and supported by means of a collapsible, three-ribbed, galvanized metal frame which fastens to the messenger strand. Both ends have openings which can be laced from the inside after the tent is in place on the platform and over the messenger.

Q. We are using indirect lighting fixtures in our operating room and wish to paint the ceiling so as to reflect as much of the light as possible. Would you recommend aluminum paint for this purpose?

A. Aluminum paint will make a soft diffused light but is not considered very efficient as a reflector. We would suggest a good grade of white paint. Aluminum paint reflects only about 41.9 per cent of the light while white paint reflects about 84 per cent. Any good paint store will recommend a good paint for this purpose.

Showmanship In Business

(Continued from page 20)

weren't producing their quota of work. "How is it," Schwab asked, "that a man as capable as you can't make this mill turn out what it should?" "I don't know," the man replied, "I've coaxed the men; I've pushed them; I've sworn and cussed; I've threatened them with damnation and being fired. But nothing works. They just won't produce." It happened to be the end of the day, just before the night shift came on. "Give me a piece of chalk," Schwab said. Then, turning to the nearest man: "How many heats did your shift make today?" "Six." Without another word, Schwab chalked a big figure six on the floor, and walked away. When the night shift came in, they saw the "6" and asked what it meant. "The big boss was in here today," the day men said. "He asked us how many heats we made, and we told him six. He chalked it down on the floor." The next morning Schwab walked through the mill again. The night shift rubbed out "6", and replaced it with a big "7."

When the day shift reported for work the next morning, they saw a big "7" chalked on the floor. So the night shift thought they were better than the day shift, did they? Well, they would show the night shift a thing or two. They pitched in with enthusiasm and when they quit that night, they left behind them an enormous, swaggering "10." Things were stepping up.

Shortly this mill, that had been lagging behind in production, was turning out more work than any other mill in the plant.

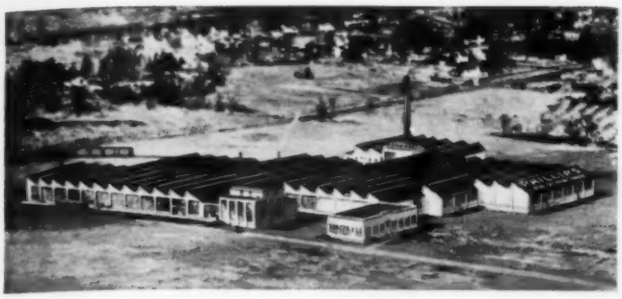
IN their employees coat room one telephone company has a large mirror over which are the words "Here's how you look to the customer." This personalized "stopper" keeps appearances up to par.

For $25 I bought a small electric sign with changeable letters to carry the name of the week's sales contest leader. The boys and girls worked harder to get their name in lights over the merchandise manager's door than they ever worked for a commission "Man Liveth not For Bread Alone." Don't ever forget that.

● So put your audience on the stage. The public isn't bad at acting. Make your customer the leading lady. She doesn't want any salary. In fact—she'll pay *you* handsomely. All she wants is applause.

FREE: Send a self-addressed stamped envelope for your copy of The Showmanship Yardstick—a 36-notch check list of showmanship elements. It's free.

Acknowledgment is made to Harper Brothers for permission to reprint parts of "Showmanship in Business," by Kenneth Goode and Zenn Kaufman.



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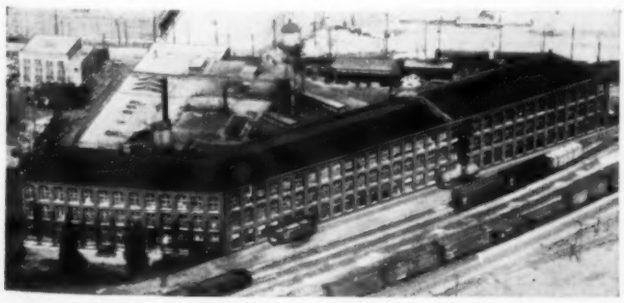

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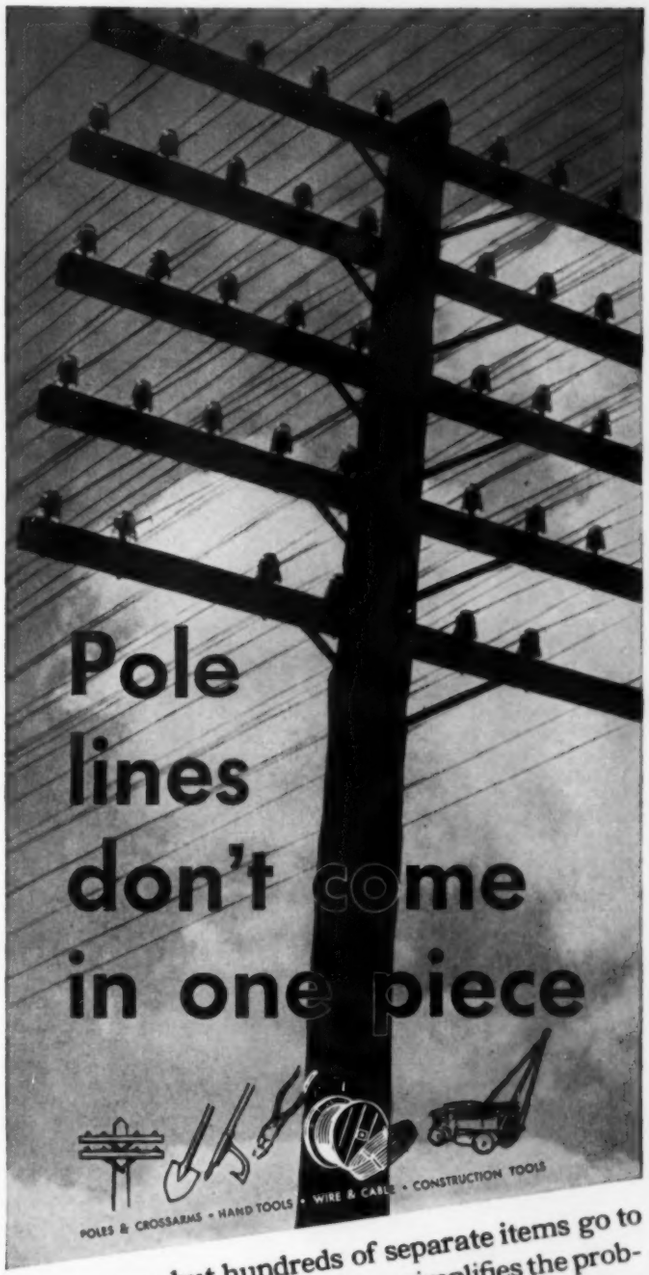

NOT one, but hundreds of separate items go to make a pole line. Graybar simplifies the problem of assembling these supplies by providing (1) poles and crossarms and everything that goes on them including all hardware (2) wire and cable (3) everything needed to set the pole up—labor-saving construction tools, hand tools, linemen's tools, and safety equipment, and (4) underground materials. Also, Graybar's Service of Supplies makes these products available to the telephone industry...*quickly, conveniently, completely.*

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LAWRENCEVILLE, ILLINOIS

New Vice-President of Theodore Gary and Company

G. L. GRAWOLS, treasurer and director of Associated Telephone and Telegraph Company and officer and director of several of its subsidiaries, was recently elected vice-president of Theodore Gary and Company, whose interests include extensive telephone and electrical manufacturing plants and telephone operating enterprises both in the United States and abroad.

Mr. Grawols has held executive offices in various companies of the Gary group since 1928, and during that time has been engaged largely in accounting matters and corporate organization and finance. In his new position as vice-president of Theodore Gary and Company, Mr. Grawols will maintain the closest possible contact with the group's activities.

Born in 1892, Mr. Grawols was educated at Hillsdale College where he received his B. A. degree. During later years, he supplemented this training with post graduate studies at the University of Michigan and Northwestern University, where he specialized in accounting, business administratiton and business law.

G. L. Grawols

During 1917 to 1919, he served in various departments of the United States Navy, both at the Great Lakes station and at the Bureau of Supplies and Accounts in Washington. Subsequent to returning to civil life in 1919, he entered the employ of Arthur Andersen and Company, well-known Chicago firm of public accountants. In 1921, he received his certified public accountant's degree in Illinois.

When Mr. Grawols joined the Theodore Gary and Company group in July, 1928, he became secretary-treasurer, and later vice-president and treasurer of Associated Telephone and Telegraph Company. In addition he has held and still holds offices and directorships in various of the leading companies in the group.

At the present time, in addition to this recent appointment as vice-president of Theodore Gary and Company, he is treasurer and director of Associated Telephone and Telegraph Company and of Automatic Electric Company, director of Pan-American Telephone and Telegraph Company, and comptroller and director of several companies subsidiary to Associated Telephone and Telegraph Company.

Other officers of Theodore Gary and Company include E. C. Blomeyer, vice-president; H. L. Gary, president, and A. F. Adams, chairman.

STEEL STRAND ❖ TELEPHONE WIRE

Crapo GALVANIZED PRODUCTS

SPECIFIED BECAUSE OF PROVED PERFORMANCE

Crapo Galvanized Steel Strand has earned its enviable reputation for long, dependable, economical life by outstanding performances in actual service. That's why it so often is specified by leading utilities for the more important construction jobs. The heavy, uniform, pure zinc coating—applied by the *Crapo* Process—is notable for its adhesion and ductility; its ability to withstand bending and twisting; its lasting resistance to corrosion. Both the finished strand, and the wire from which it is made, conform in every detail to the most rigid specifications for tensile strength, elongation, size, galvanizing and ductility.

Crapo Galvanized Strand is readily available in all standard grades and sizes. Ask your Jobber, or write direct for technical details!

Rambler Rambles Again

By J. A. SMITH

Dodging through cyclones and other forms of unusual weather Rambler and the family left Chicago, March 15th, to return to his old stamping ground in Texas. Excellent time was made as the Pontiac showed a coverage of 559 miles when we pulled up at Memphis eleven hours after we left Chicago. At Blytheville, Arkansas, we missed the cyclone, by less than 5 minutes, which destroyed more than $100,000 worth of property and took several lives.

▲

At Texarkana we made our usual courtesy stop with our old friend J. E. Stuart of Two States Telephone Company. Mr. Stuart assured us he would be in Dallas the following week to attend the Texas Telephone Convention and we ambled on our way and stopped for the night with old friends over in East Texas. Inasmuch as these friends were not in the telephone industry, we discussed farm problems and the Roosevelt administration and, strange to say, found the farmers in that section fairly enthused over the Roosevelt idea of shorter crops and a bonus for the land not used. But these fellows are only human and trying to get all they can along the line of least resistance.

▲

Turning down an invitation to play golf with others at Dallas the day previous to the convention for reasons given privately to Oscar Burton, president of the Texas Association, we paid our respects to telephone executives and others over at Forth Worth. The Forbes chart showed Fort Worth and that particular section of Texas as the bright spot of the nation in a business way and the activities of building contractors and others showed that they really took this chart seriously. Business really was good around Dallas, Forth Worth, and those sections shown on the Forbes map.

Over at Dallas we spent the first half-day shaking hands with old friends and making the acquaintance of those who came into the picture after we left Texas ten years ago. The formalities over we began making contacts with those whom we thought might give us a lead for a news story or something out of the ordinary. Well, the day wasn't a howling success but we did learn quite a few things which our readers might be interested in.

▲

Oscar Burton starts off the convention with a bang. With a microphone in front of him, he fairly roared his greetings to those present and especially to those from outside the state of Texas. At the first roll call Louis Pitcher of the National Association, Chicago, W. C. Hedricks, Secretary of the Missouri Association, C. C. Deering, secretary of the National Association of Des Moines, Secretary Couch of the Kansas Association, Bernie Richardson of the Oklahoma Corporation Commission, Stanley Edwards of Telephony, and writer, of Telephone Engineer, were called upon to make short talks.

▲

Mr. and Mrs. Pitcher followed the lead of Rambler and drove to Texas in order to see more of the country. After the convention they drove on to San Antonio and other points before beginning their journey home by way of Oklahoma City where they attended Oklahoma convention. C. C. Deering advised Rambler that he likewise drove to Texas this year and spent a week looking over that vast state. Both of these gentlemen advised us there is plenty to be seen in Texas and on the road to and from that state.

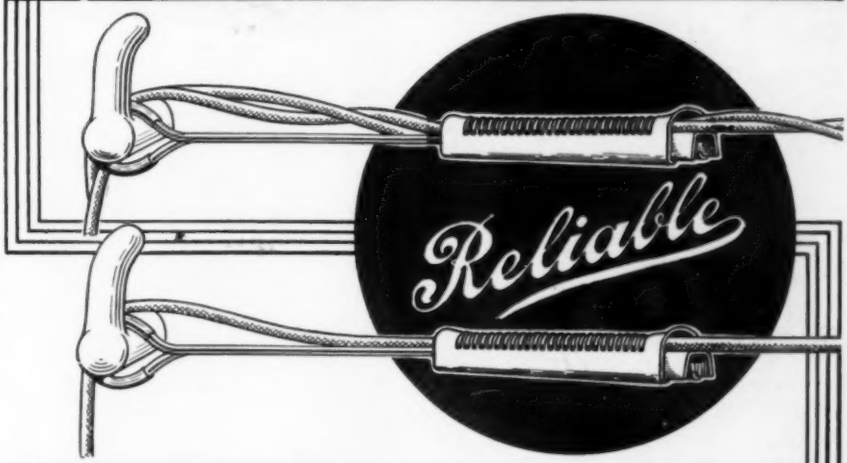
▲

T. P. Bearden of the Home Telephone and Electric Company of Baird informed us he recently took over the exchanges at Carrolton, and Hebron, Texas, and added them to his string of telephone exchanges now reaching almost to Dallas.

Don Hunsaker of the Southwestern Bell Telephone Company, Dallas, celebrated another of his famous birthdays during the convention. The Adolphus Hotel where the convention was being held furnished a very beautiful cake for Mr. Hunsaker, which was delivered to his room at the hotel and which he and his friends enjoyed very much.

W. C. Dillon, the anchor magnate, paid a return visit to the Texas Telephone Association convention this year for the

"STANDARDIZE DEAD-END TIES"



DROP WIRE CLAMPS

- The type "P" drop wire clamp is an ideal device for attaching No. 17 BS twisted pair of parallel drop wire to poles and buildings. It prolongs the life of the drop wire, permits free swinging at the tie, places all of the wear on the hardware and eliminates the sharp bends necessary with other methods.

This clamp is easily and quickly installed, making a very neat installation. Slack in drop wires can be taken up quickly without leaving any weak spots on the wire. Write for samples.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
1145 CARROLL AVENUE — CHICAGO, ILLINOIS

first time since 1914. For two years Dillon managed the Independent exchange at Corsicana and also served as the Secretary of the Texas Independent Telephone Association. After leaving Texas, Dillon saw world war service and later developed a bank burglar alarm which he sold throughout the country. For some time he has resided in Chicago where he entered the manufacturing business, making anchors and other products. Dillon marveled at the growth of Texas and especially at the cities of that state since leaving it more than two score years ago.

▲

Rambler stumbled upon W. H. Griffin of Valley Mills whom he had known as a jeweler some forty years ago. Since that time he has reformed and gone into a real live industry, and is now successfully operating the Valley Mills Telephone Company. Rambler remembers very vividly his first watch which was sold to him by this man Griffin and which proved later to be not only brass but second hand as well. This sin of Griffin has long been wiped out from the book of knowledge by Rambler and is charged up as part of his education. Later Rambler graduated and felt competent to enter the publishing business in general.

▲

We learn from our old friend T. P. Bearden that he now has a son working in the factory of the North Electric Mfg. Company at Galion, where he is learning more of the intricacies of "All Relay" equipment. This son, Frank Bearden, has been in the Ohio town for some time. Another son, Fabian, is now in his fourth year at Texas U. where he is taking a course in pharmacy.

▲

At Oklahoma City Rambler attended the convention of the Oklahoma Telephone Association and found that friend "Hube" had assembled quite an aggregagation of speakers and a good show was in readiness for those who attended. Oscar Burton who has presided for so many years as President of the Texas Association, attended the Oklahoma meeting as a guest speaker and now knows how it feels to be on the other end of the program. He admitted that it was more embarrassing to appear on the program as a speaker than to announce who was to be the next speaker on his own program.

▲

At the Oklahoma meeting Rambler appeared on the program speaking from his well known subject "Ramblings." He told in a five page dissertation what he would do "if—"

▲

Cyclones infested the highway on our return home but we successfully eluded them and reached the city of Chicago without misshap. Remaining in Chicago only a week Rambler and his family departed for the East where they will make an extended business and pleasure trip.

Death Takes George W. Todd

George W. Todd, 78, who was a former president of the Stromberg-Carlson Telephone Mfg. Co., died March 20th at his home in Rochester, N. Y., after an illness of four years. Mr. Todd, a director of the Stromberg Company in 1909, became successively vice-president in 1911, president in 1915 and chairman of the board in 1923, holding the latter position until taken ill in 1933. It was under his guidance that Stromberg-Carlson went through the war period.

He leaves his widow, Mrs. Grace L. Todd, a sister, two grand-children and three sons, one, Walter W. Todd, who is a present director of Stromberg-Carlson.

George W. Todd

Stromberg's George A. Scoville Guiding Sales In April Drive

"Mystery Prize" To Be Awarded For Best Sales Accomplishment During "General Manager's Week"

George W. Scoville, Vice-president and General Manager of the Stromberg-Carlson Telephone Mfg. Company

A Stromberg-Carlson April Sales Drive finds George A. Scoville, their Vice-President and General Manager, acting again as Sales Manager, just the same as he did before he was elevated to his present post.

Lloyd Spencer, General Sales Manager, expressed appreciation of Mr. Scoville's consent to take over direction of the Sales Department during April and commented on the stimulation and enthusiasm it is inspiring in the entire Stromberg-Carlson sales group.

A "Mystery Prize" will be awarded to the sales representative who shows the most progress during the period, based on volume, general performance and achievement of his share of the campaign's goal.

Every phase of Stromberg sales is under Mr. Scoville's direction this month. All salesmen's reports are personally examined by him. He is editing the firm's weekly publication and supervising other selling activities to bring the force of his personality into direct contact with all Stromberg men in the field.

Exide BATTERIES for every Telephone Service

THE ELECTRIC STORAGE BATTERY CO., Philadelphia

World's largest manufacturers of storage batteries for every purpose.

TELERING

For better and cheaper ringing.

No Radio Interference

30-day free trial

Only ONE Contact!

Price $44.00

F. O. B. factory

TELKOR, Inc.

ELYRIA, OHIO

(See our space in next month's issue)

Carl Brorein Selected by Peninsular

Carl D. Brorein of Tampa, for several years general manager of the Peninsular Telephone Company, has been elected to the presidency of that organization, succeeding the late W. G. Brorein, who was his uncle.

Mr. Brorein has a large circle of friends throughout Florida, and particularly in the south Florida territory where his company has its myriad lines, and they are sending him their congratulations on his elevation to headship of the big Peninsular organization.

Other officials chosen at the annual meeting were: J. A. Griffin, vice-president, Tampa; Frank D. Jackson, secretary, Tampa; C. E. Wilson, assistant secretary, Tampa; C. E. Archer, treasurer and general auditor, Tampa; James C. Handley, assistant treasurer, Tampa. As board of directors—Messrs. Brorein, Archer, Jackson, Griffin, Tampa; J. H. Agee, Lincoln, Nebr. T. C. Woods, Lincoln, Neb.; Earl L. Peters, Toledo, Ohio; L. C. Gerry, Providence, R. I.; Murray H. Coggeshall, New York.

Walter J. Gallon Dead

Walter J. Gallon, 63, Antigo, Wisconsin, president of the Langlade Telephone Company, and president of the Wisconsin State Telephone Association died at his home on March 29. He had been unwell for the past 2 years.

A member of the board of directors of the United States Independent Telephone Association, Mr. Gallon had been actively engaged in the telephone industry for 39 years.

Beginning his career as an installer's helper, his experience carried him to ultimate success through various changes climaxed by his organization of the Langlade Telephone Co. in 1930. During most of this time he was actively engaged in Association activities. He was particularly well known for his theories of management of telephone companies being a great believer in personal contact with subscribers. His messages at future Association meetings will be sorely missed.

Funeral services were held March 31. Survivors are his widow and a brother who resides in England where Mr. Gallon was born and educated.

Wright and Eaby, New Pennsylvania Directors

John H. Wright, president of the Home Telephone Company of Ridgeway (Penn.) and president of the Pennsylvania State Telephone and Traffic Association, was elected Director-at-Large by the Eastern District of that area in a meeting held in Philadelphia, March 24th. Also selected was Mr. C. E. Eaby, vice president and general manager of the Denver and Ebhrata Tel. & Tel. Company, who is to fill the vacancy created by the death of the late Samuel Mounce.

Vice presidents Joseph Stockwell and G. S. Herbert, and directors H. A. Oberdorf and G. B. Rudy, whose terms had expired, were elected to succeed themselves as representatives of the Eastern District.

Miss Anne Woodbury Weds

Mr. and Mrs. Ben Woodbury, Rochester, N. Y., announced the mariage of their daughter, Anne, to Mr. Thorkel Scherwin of London, the son of Mrs. Astrid Scherwin of Copenhagen, Denmark.

On February third the former Miss Woodbury sailed, from New York, on the Berengaria for England, where she was the guest of friends in London until her marriage on February sixteenth in St. Marys Parish Church (Episcopal).

Mr. Scherwin is a foreign representative for the Melchior, Armstrong, Dessau Company, Inc., of New York City, with headquarters in London, where he and his bride have taken up residence in Winchester Court, Kensington, Church Street, London W8.

Gets Ship-To-Shore Permit

Thorne Donnelley, vice president of the Reuben H. Donnelley corporation, printer and publisher, was notified April 7 that the Federal Communications commission has granted him authority to construct a 400 watt coastal harbor radio-telephone station at Lake Bluff, Ill. Donnelley, who is a yatchsman and radio amateur, said that he will soon have in operation a station which will provide radio telephone service with yachts and vessels operating on Lake Michigan.

Donnelley has reached an agreement with the Illinois Bell Telephone company under which the phone company will make connections with the Lake Bluff station.

Donnelley's proposed service was opposed by the Lorain County Radio corporation, Lorain, O., which provides a Great Lakes radiophone service. In granting Donnelley permission to open service the FCC ruled that there was need of a harbor station to serve the Chicago district.

LATE LISTS AVAILABLE
ON
TELEPHONE BOOKS
Write TELEPHONE ENGINEER

New nut housing. Locks Anchor firmly on rod. Rod cannot slip thru Anchor when being installed.

EVERSTICK ANCHORS...

Engineers appreciate Everstick features which assure safety, long life and ease of installation in any soil condition.
A complete line with 3 types of expanding Anchors and rigid types of Cone Anchors. All sizes and holding capacities. Write for Everstick literature including new folder on Rural Electrification Lines.

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ANCHOR CO.
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TELEPHONE PRUNERS

This powerful pruner cuts closer, is stronger than any other similar tool on the market. Can be operated in close tangled growth; cutting easily and cleanly branches up to 1½" in diameter. No trouble with spring breakage.

Here is the only pruner with the famous Seymour Smith "Center Cut" construction; safety catch to lock blade closed; one piece tempered tool steel blade; reinforced hook; extra long life spring; ball bearing pulley; highest quality chain; unbreakable iron head.

Designed by experts for experts; demanded by public utility companies everywhere, it will pay you to write for literature and prices.

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134 MAIN STREET
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A GRIP FOR ALL NEEDS

No. 1628-5 B. "Chicago" Grip. Maximum opening .563. Minimum opening .115. Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to 1/2 in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

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Foreign Distributor: International Standard Electric Corp., New York

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The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.
3200 BELMONT AVENUE

Air Conditioning In Telephone Industry

(Continued from page 18)

does the cost of maintenance add up, but the interruption of routine handling of the toll charge slips causes inconvenience in the maintenance of the high quality of service to which the public has become accustomed. Clearing out a "jam" of tickets in a pneumatic tube sometimes results in the restruction of some and the resultant loss of toll revenue. Again, the magnitude on any losses from this cause is unknown. Maintenance of proper relative humidities will entirely eliminate the source of trouble.

Description Of Some Existing Installations

The first installation of air conditioning equipment in a telephone exchange, of which we have records, was made in 1917 for the Chesapeake & Potomac Telephone Company, Norfolk, Virginia. The system, which consisted of central station spray type conditioning apparatus and duct work to supply air to the Operating and Terminal rooms, was designed to hold 80 degrees DB and 50% in summer weather of 95 degrees DB and 80 degrees WB. Winter design conditions were 70 degree and 40% in 0 degree weather. The refrigeration equipment consists of an ammonia compressor and a baudelot cooler.

About ten years later the Mountain States Telephone Company, Phoenix, Arizona, installed air conditioning for the Machine Switch room and business offices totaling about 25,000 sq. ft. of floor area. The apparatus, again, consisted of a central station spray dehumidifier. The refrigeration is furnished by a centrifugal machine using Carrene as a refrigerant.

During the following few years quite a number of the smaller exchanges followed the pioneers in air conditioning at least sections of their plants. Although a complete directory of installations is not available, it is interesting to note the wide distribution of such installations over the face of the globe, as indicated by the following partial list:

In the United States:

Associated Telephone Co., San Bernardino, Calif.
So. California Telephone Co., El Centro, Calif.
Central District Telephone Co., Cincinnati, Ohio.
Chesapeake & Potomac Tel. Co., Norfolk, Va.
Citizens Telephone Co., Grand Rapids, Mich.
Los Angeles, Dept. of Water & Power, Los Angeles, Calif.
Fowler Telephone Co., Rella, Iowa.
Illinois Bell Tel. Co., Chicago, Ill.
Mountain States Tel. & Tel. Co., Phoenix, Ariz.
New York Telephone Co., Buffalo, N. Y.
Pacific Tel. & Tel. Co., San Francisco, Calif.
Rochester Telephone Corp., Rochester, N. Y.
Tri-State Telephone Co., El Paso, Texas.
United Telephone Co., Goodlands, Kansas.
United Telephone Co., Carlisle, Pa.
Southern Bell Tel. & Tel., New Orleans, La.
New York Tel. Co., (for AT&T), New York.

In Mexico:

Cerveceria Cuauhtemoc, Monterey.
Ericson Telephone Co., Vera Crub.
Mexican Telephone Co., Matamorros.
Mexican Telephone Co., Tampico.
Mexican Telephone Co., Vera Cruz.

In Panama:

Cristobal Telephone Exchange, Cristobal.

In Manila:

Manila Telephone Co., Manila.

In Japan:

Manchurian Tel. & Tel. Co., Hsin King.
Taihoko Telephone Co., Taihoko.

In China:

Shanghai Mutual Tel. Co., Wayside Exchange Shanghai.
Shanghai Mutual Tel. Co., Montigny Exchange, Shanghai.
Shanghai Mutual Tel. Co., West Exchange, Shanghai.
Shanghai Mutual Tel. Co., North Exchange, Shanghai.
Shanghai Mutual Tel. Co., Pichon Exchange, Shanghai.

In Australia:

City West Telephone Exchange, Melbourne.
Edgecliffe Telephone Exchange, Sydney.

In South America:

Compania Telefonica de Barranquilla, Columbia.

In Cuba:

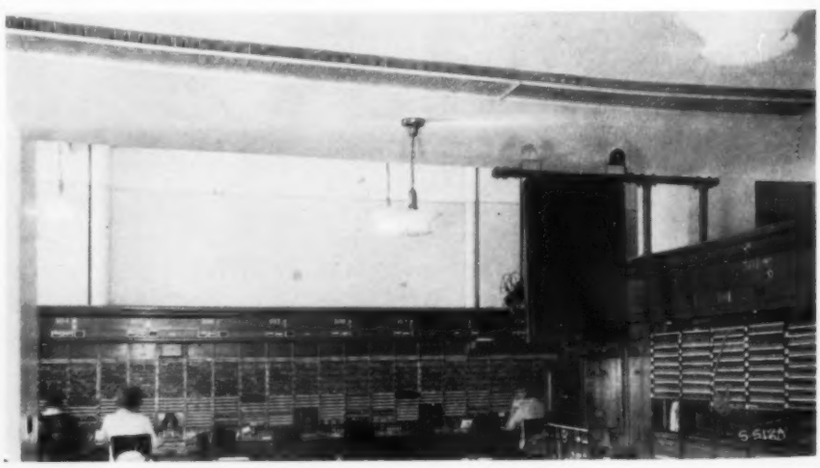
Cuban Telephone Co., Havana.

In England:

Standard Telephones & Cables, Ltd., New Southgate.

(TO BE CONTINUED)

EDITOR'S NOTE: This is the first of series of two articles on Air Conditioning prepared especially for TELEPHONE ENGINEER. The concluding article will appear in May.



Telephone operating room showing installation of adjustable pan type outlet for overhead distribution.

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By GEORGE F. MAEDEL

Head of Radio Frequency Engineering Department, R. C. A. INSTITUTE

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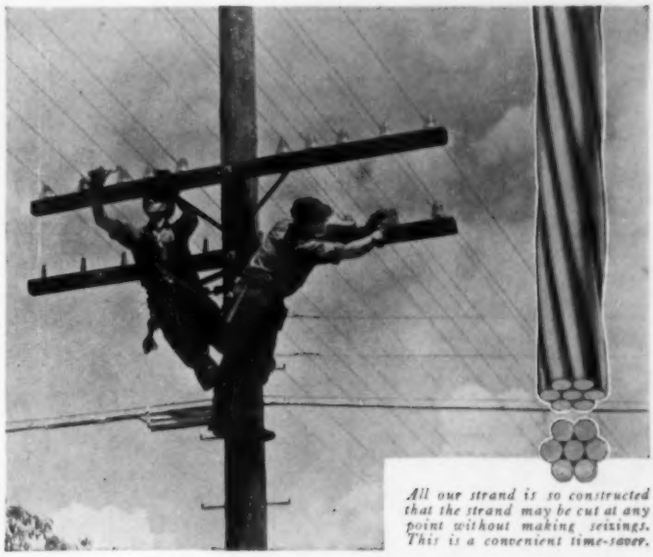

All our strand is so constructed that the strand may be cut at any point without making seizings. This is a convenient time-saver.

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PERFECTED Telephone, Telegraph Wires and Strand stand up under incessant weathering forces which weaken and destroy wires not made with adequate corrosion-resisting features.

Perfected Telephone, Telegraph Wires and Strand are evenly and heavily coated with commercially pure zinc. This protective layer is applied by the "hot-dip" process, which assures a uniform chemical bonding of the zinc and the steel. This coating has no weak point of contact with the steel . . . there is a complete union of the two metals . . . a feature which prevents flaking of the galvanizing coat. The coating is ductile . . . strong . . . corrosion-resistant.

The ability of these products to last under severe service conditions has been proven by tests in the laboratory and in actual use. You can count on them for complete dependability. Specify Perfected Telephone, Telegraph Wires and Strand.

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AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Co., New York, *Export Distributors*

UNITED STATES STEEL

Mrs. Anna Webster, owner of the Juneau-Douglas Telephone Company selected a 12-1600 Masterbuilt Switchboard as the most logical equipment.

Kellogg Masterbuilt Installed In Alaska

Mrs. Webster Holds Unique Position as Owner and Operator of Foremost Alaskan Utility. Installs New Kellogg Masterbuilt Switchboard for Juneau—Douglas Telephone Company.

By C. M. Robinson
Installer, Kellogg Switchboard & Supply Co.

GOLD, northern lights, awe inspiring Glaciers of unbelievable grandeur, thousands of miles of unexplored territory—these are Alaska! And just as unusual as these, is the story of small, soft spoken, Mrs. Anna Webster, sole owner and operator of one of Alaska's important utilities, the Juneau-Douglas Telephone Company.

Culminating its forty-two years of public service, the Juneau-Douglas Telephone Company recently installed a complete new 3-position Kellogg 12-1600 Masterbuilt switchboard and associated equipment. With this modern equipment, telephone service in the Juneau territory is equal to that of any of our largest cities and better than many. Situated where it is, up in the "top corner of the world" in a tremendous expanse of still virgin and unpopulated country, this is indeed a tribute to Juneau and its progressive telephone company.

● The company was started in the 1890's by Edward Webster and Frank Back, partners in a Douglas store in the Gold Rush days. Mr. Webster lived and ran the store in Juneau; Mr. Back lived and worked in Douglas. The two towns were separated by a three mile channel of water—the only communication between them was by canoe. In winter, trips were hazardous at all times and frequently impossible for weeks at a time. As a result the two men conceived the idea of laying a submarine cable across the channel to assure a dependable means of communication. Remember, these plans were made in the 1890's—a time when even talking over wires was in its infancy and submarine cables all but unknown. However, the men were undaunted and because of their determination and vision, it was not long before a cable was laid and a telephone system was an actuality. Shortly after, a five line board was installed with a mine, a druggist and a grocer as their original subscribers. Incidentally, the grocer still has the same telephone number today—No. 5, the only business in Juneau today that was among the first five subscribers. Gradually, as Alaska became known for its rich furs, its unequalled fishing grounds, and its minerals—gold was discovered in 1880—the population of Juneau grew and the telephone company expanded with it. The first directory was issued in 1907 and listed 100 subscribers.

Mrs. Webster became associated with the company as operator in charge of the Douglas exchange in 1904 and has been associated with it ever since. After the death of Mr. Webster in 1918, she took over the active management of the company and has been assisted in recent years by her daughter, Mrs. Minnie Hurley.

● From the five original stations, the company has grown to 900 subscribers. From the original 5-line switchboard the company has expanded to a Kellogg 12-1600 line Masterbuilt switcboard, the most modern equipment available. The 3-position Masterbuilt is equipped with 900 common battery lines and sixty rural lines. Position No. 1 has Universal cord circuits. Positions No. 2 and No. 3 are equipped with feature cord circuits. Not only in this equipment giving subscribers the finest service now, but it will continue to do so for many years to come. Masterbuilt switchboards are built with an eye

Mr. C. M. Robinson, Kellogg installer, is glad he's not a post man in Juneau. Here he is at the foot of the stair leading to the telephone office and the next street level.

Mrs. Webster and Mr. Robinson at the foot of the famous Mendenhall Glacier near Juneau.

to future growth or positional changes. Allowances are made for them and when they come, the change or addition is made quickly and easily. Yet there is no wasteful investment in surplus idle equipment. Masterbuilt equipment crosses the bridges as they are reached. Positions can be changed overnight—multiples need not be disturbed. Installation and maintenance costs too are surprisingly low.

Juneau subscribers are well pleased with the service and agree that it is an invaluable aid to the city's future growth and progress. Juneau itself is named after Joe Juneau for it was he and Richard Harris who had discovered gold in Alaska in 1880. The gold rush of the 80's laid the city's foundation and goldmining is still its principal industry. Within the city limits is located the world's largest low grade ore mine in the world. Many of the city's 6000 people are engaged in fishing, the second largest industry. Taku, Mendenhall and Muir glaciers, famous thruout the world, are all within a few miles of Juneau. Tides, too, in the territory reach the record of 22 foot high tides and minus 1.65 low tides During the summer months the days are nearly 24 hours long. In winter, however, daylight exists only from ten in the morning to three-thirty in the afternoon.

● An interesting country to be sure, yet despite its location in the far corner of the world, Juneau has all modern facilities. For instance, current daily papers include in their grocery advertising columns — bananas, cantaloupes, grapes, lettuce and so on. Among its many civic advantages Juneau counts its new telephone system as one of the best.

Editor's Note: C. M. Robinson, the writer accompanied the switchboard to Alaska and supervised the entire installation. With the installation work, fishing and sight seeing, many busy and pleasant days were spent.

Graybar Opens 85th House

In February Graybar opened the doors of its new office located at 1927 Main Street, Columbia, South Carolina. The Columbia office makes the 85th in Graybar's national system of Distributing Houses. This office serving practically the entire state of South Carolina, is under the direction of Mr. George T. Marchmont, Southern District Manager located in Atlanta. Among the important products distributed out of Columbia is the complete line of Hotpoint major appliances.

J. H. Littleton, Jr., Manager of this new house, is well known to many of the trade as he covered the Columbia District as Salesman for many years. Mr. Littleton has been with the Graybar Company since 1916.

Zimmerman Is Advanced By Owens-Illinois

W. P. Zimmerman, recognized in the building industry as the man who has played the most prominent role in developing Insulux glass block, the most-talked-about structural material of the last decade, has again been promoted by the Owens-Illinois Glass Company.

He has already left Muncie, Indiana, where Owens-Illinois manufactures Insulux glass block for the building industry, for Toledo to take up his larger assignment as general manager of the company's Industrial and Structural Products division.

Mr. Zimmerman entered the glass business at Muncie in 1920, soon after returning from overseas, as sales manager of the Hemingray Glass Company, manufacturer of communications and power lines insulators and other pressed ware glass products.

When Hemingray merged with Owens-Illinois in 1933, Mr. Zimmerman was made assistant plant manager under the enlarged regime, but before the end of the year had been promoted to the plant managership.

Late in 1937, Harold Boeschenstein, Vice President and General Manager of Owens-Illinois, finding management of these fast-growing operations required too great a proportion of his time, relinquished direct management to Mr. Zimmerman.

W. P. Zimmerman, General Manager Industrial and Structural Products Division, Owens-Illinois Glass Company, Toledo, Ohio.

In his new position as general manager of the I & S P division, Mr. Zimmerman will coordinate manufacturing and sales, and generally supervise all operations of the division. W. C. Davis continues as Director of Merchandising.

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Floyd O. Hale Dies

Floyd Orlin Hale, chairman of the board of the Illinois Bell Telephone Company, died March 18 of a heart attack at Hartford, Conn. He was born in West Windsor, Vt., April 13, 1882.

He joined the Bell system following his graduation from Dartmouth College in 1903, beginning in the traffic department of the Central District and Printing Telegraph Company at Pittsburgh, at that time an associate company of the Bell system operating in western Pennsylvania and eastern Ohio. In 1909 he became an engineer for the American Telephone and Telegraph Company; was chief engineer of the Southwestern Bell Telephone Company in St. Louis from 1912 to 1916; in 1920 was general manager for this concern in Missouri and Arkansas, and in 1921 was made chief engineer of Illinois Bell. Next year he was elected vice president and general manager, and in 1926 he was chosen vice president in charge of operations, succeeding W. R. Abbott as president in 1930. On February 23, this year, Mr. Hale was named chairman of the board.

New Catalog Available

Cook Electric Co. of Chicago, manufacturers of Telephone Terminal and Protection Equipment, has announced the mailing to telephone men of its new 36-page Catalog No. 31.

The new Cook Catalog is the largest, most complete in illustration and detail and finest in appearance of any they have published in the more than 35 years the company has been in business. The cover is beautifully embossed in color, page size is 8½x11, suitable for convenient filing.

The new catalog describes the complete line of Cook Telephone Terminal and Protction equipment and gives telephone men detailed information about its terminals and inside and outside protection. The new products which Cook Electric Company has added to its line are completely illustrated and described.

Cook Electric Co. announces that it will be glad to send a copy of its new Catalog No. 31 to any telephone man who has not received a copy upon written request to its offices at 2600 Southport Ave., Chicago, Ill.

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Kellogg No. 2696 type 4-bar 1000-1600 or 2500 ohm ringer compacts with short arm @ 8.00

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Monarch No. 33 desk set with 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @ 7.85

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Write for Bulletin

REBUILT ELECTRIC EQUIPMENT CO.
1934 West 21st St., Pilsen Sta.
Chicago, Ill.

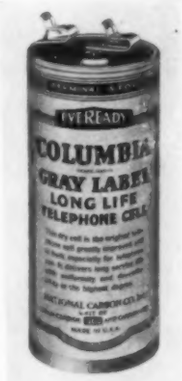
"Tapping In" On Washington

(Continued from page 20)

pending Wisconsin Telephone Co. case probably will not be decided until the fall and then will be subject to a court test during the next session of Congress.

Guessing contests as to the results of the November, 1938, elections are now the vogue among Washington observers. One of the most interesting canvasses of Democratic and Republican political leaders and principal Washington newspapermen showed recently the definite trend that the Republican membership in the Senate and House was believed to be certain to achieve a gain. The consensus was that there would be an increase of 60 to 65 seats in the House, making a total of 150 to 160 Republican Representatives, and that from 4 to 6 seats would be won by Republicans in the Senate. These gains were held to be logical despite the proposed "pump priming" plan.

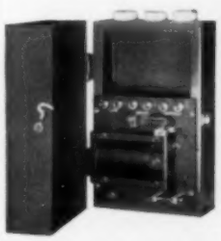
Improved Telephone Dry Cell



A leading battery manufacturer has announced an improved telephone dry cell which will be sold at the "regular" cell price. It is claimed that this cell combines the best features of the old "regular" cell with those of the "premium" cell which sold at a higher price. Since the best qualities of both cells are now combined in one, there no longer is any need for two types and it therefore is planned to have the improved cell replace the older types.

Longer service life at no increase in cost combined with the excellent sustained voltage characteristics of the ""premium" cell provide the Telephone Industry with the means of effecting still further operating economies with high transmission efficiency, making for subscriber satisfaction, it is claimed.

The manufacturer states that this is not a new, untried, experimental cell. It is an improvement on the old, time-tested cell which has established a reputation for dependability and for years has enjoyed the favorable consideration of the Telephone Industry.



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